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Steel Allocations

We have been trying to assess just what will be the impacts of the steel allocation system on the foundry industry. The allocations are to be based on the importance of use in the production of armaments or the expansion of exports. The direct consumption of steel by the foundries is not high. There are the periodic requisitions for files, a few tools for the patternshop, chaplets, studs and spirals, core-wires and rods, round bars and moulders' tools, skimmers, melting pots, furnace tools, steel boxes, hand-shanks, brads, chills, and denseners and the like. It is a long list but not one which consumes large tonnages, yet a real shortage in any one can affect production and have important repercussions on castings-consuming industries. No doubt there will be grumbles, and to be effective they should be centralized on the employers' associations for the Government planners can only be made aware of the seriousness of any particular shortage when protests carry the weight of numbers.

Foundrymen are versatile individuals and can improvise to meet certain shortages by using their own products to replace steel tools or by reclamation from the scrap heap. It should be borne in mind that old files can be sent to Sheffield to be re-cut, whilst welding can cut down to a minimum the wastage resulting from the stub ends of valuable tool steel.

The major impact on foundries, however, will not be curtailment due to the shortage of the steel components they use in their everyday business, but the impact of restrictions on their customers, who in turn will be able to order less of this and more of that. So far as exports are concerned, they should be viewed in the light of value for weight. A bath tub, for instance, is to-day a better proposition for export than, say, rain-water goods, and the Government might do worse than ascertain from the foundry industry a list of the higher-priced articles for which there is an overseas demand, and even use their influence to effect sales. The object of the industry should be to make the public aware of not only its basic character but also of its versatility. Castings can sometimes replace wrought steel, as for instance cast crankshafts, and boiler-room tools, such as the outsize spanners one sees in use there. With each industrial development, the foundry has contributed its important quota, and to-day there is no manufacturing concern which does not rely on the foundry for the static components of the machinery it uses or manufactures. Traditionally, however, the production of castings bears some fixed relationship to the production of steel, but last year the output of cast products materially increased, whilst that of wrought steel declined. There have been suggestions in the daily Press that foundry progress has been made at the expense of steel, the implication being that the foundries have had more than their fair share of raw materials. Yet, the truth is most likely that the ironfoundries never received any great proportion of imported scrap from Germany, during the earlier years, and it is the serious reduction of supplies from this source that has affected the steel industry rather than the iron-foundry. We are not convinced that both industries, except perhaps in a few cases, draw from the same scrap pile or in the case of blast pig-iron, the same blast furnaces.

Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

PRACTICAL EXAMINATION

To the Editor of the FOUNDRY TRADE JOURNAL

SIR,—With reference to your editorial in the issue dated December 20, 1951, as a result of a number of years' close contact with the technical training of foundry apprentices, both moulders and patternmakers, I feel that the apprentices who would prepare for the suggested examination are those now taking the established ones. Whilst in no way wishing to infer that a practical craft examination would not be a welcome addition to those examinations already established, it would be unwise to anticipate interesting the more practical type of apprentice.

By way of encouragement to those apprentices referred to as the artisan type, for several years I have examined for the City and Guilds of London Institute, and when assessing marks for the descriptive craft examinations, no marks are deducted for poor writing, faulty spelling, or bad English, and every attempt is made to be impartial. The student who feels his lack of ability to express himself clearly in writing or sketches should not be discouraged. The examiner notes from the student's approach to a particular question whether the ideas expressed are sound, or otherwise; it is the idea behind the sketches and writing which controls the number of marks awarded.

I am reluctantly forming the opinion that the supposed apprentice who is prepared to take a craft examination rather than the established descriptive examination, does not exist.

Yours etc.,

S. A. HORTON,
Hon. secretary.

Institute of British Foundrymen,
East Midlands Branch.
December 31, 1951.

Iron and Steel Distribution Scheme

A guide to the iron and steel rationing scheme, starting on February 4, has been published by the Stationery Office for the Ministry of Supply. Entitled "Iron and Steel Distribution Scheme—Notes for Consumers," the booklet states the types of iron and steel covered by the rationing scheme and those exempt. The latter include non-alloy iron, high-speed steel, sheets with specified electrical properties and most castings.

The publication describes and illustrates authorization forms needed to buy, sell and use iron and steel covered by the scheme: a list is given of those goods for which such forms are not required from consumers. A quick reference table of the Government departments responsible for sanctioning the use of steel, showing the industries served, enables consumers to find at a glance where they should apply.

Under the rationing scheme, small quantities of some materials—ranging from 2 cwt. of alloy iron and steel to one ton of certain other items, *e.g.* heavy plates or forgings—can be bought each month free from control, and these are listed and the certificate needed when such purchases cost more than twenty shillings is reproduced. The "small consumers' scheme," under which firms using less than 25 tons of iron and steel in each period may receive their allocation from Ministry of Supply Regional Controllers is summarized. The booklet is on sale at H.M. Stationery Office, price 1s. net.

Ladleman's Compensation Claim Fails

An accident at a West Bromwich foundry, in which an iron carrier was stated to have fractured his thumb between a ladle of molten iron and a girder, was described at West Bromwich County Court on Wednesday last. The carrier, George Cox, of West Bromwich, applied for compensation from the firm, Newby & Sons, Limited, also of West Bromwich.

Mr. D. Platt-Mills, for the plaintiff, said that a new system of conveying molten metal from the cupolas to the casting points was introduced in 1950. A series of overhead runways, consisting of girders, were set up, from which containers were suspended. When the accident occurred, the overhead bogie jammed at a junction and, when the container swung, the plaintiff's thumb struck a vertical iron girder. He was given first-aid attention and continued at work for two weeks, but then had to take two weeks off. He still had some loss of mobility in the thumb.

An expert called by the plaintiff, Mr. James Martin, said that when he tested the runway, at the same junction after the accident, it jammed again. He thought the alignment of the girders was not true. It had since been corrected, he said. Mr Fred Leeson, chairman of the shop committee, said that complaints had been made about this part of the runway and a deputation had informed the management.

For the firm, it was contended that the plaintiff was travelling too fast in pushing the container. Judgment was given for the defendants, with costs.

Forty Years Ago

The FOUNDRY TRADE JOURNAL for January 1, 1912, is quite interesting. There had been during 1911 an over-production of pig-iron—but then, of course, there was no planning! An extremely interesting précis of a lecture by Professor Thomas Turner was printed on "The Solidification of an Iron Casting in a Mould." The London branch of the Institute of British Foundrymen held its first "annual dinner" at the Holborn Restaurant with Professor Turner as the chief guest,—eighty members were present. A lecture by Mr. R. Mather, now president of the Iron & Steel Institute, on "The Testing of Moulding Sand" revealed not only the prevailing ignorance of the subject amongst foundrymen, but an amazingly accurate forecast of future developments. The list of new companies registered the names of the Stock Convertor Company and Clifton & Baird of Johnstone.

Information in Industry

Much of the success of the drive for industrial productivity depends on the speedy provision of accurate information in the scientific and industrial fields. Recognizing this fact, the Department of Scientific and Industrial Research has recently made available to Aslib a special grant to establish a consultant service in the special library and information field. This service, drawing upon the existing resources and backed by new research into informative techniques, is now available to advise those who are considering the establishment of special libraries and information services in industry and research establishments, and to assist the development of existing services. Details regarding this and other facilities provided by Aslib can be obtained from the director, Aslib, 4, Palace Gate, London, W.8.

Castings for a Small Diesel Engine*

By H. J. M. Conacher and R. Leeks

In presenting this Paper it is intended to illustrate how a foundry producing whiteheart malleable castings undertook successfully the production of high-duty, grey-iron castings for a small Diesel engine. In the beginning of the year 1948 it became apparent to the management of the company that a recession in trade was imminent, and after a review was made of several products it was decided to enter into the Diesel-engine field. The initial problem was to decide what type and power of engine or engines to manufacture, bearing in mind the capacity of the various shops and the requirements particularly of the export market. The final decision was to produce the 2C Diesel engine of 8 h.p. at 1,200 r.p.m. This engine has 4½-in. bore and 4-in. stroke.

Design

The design of the Diesel engine selected follows the original broad outline and includes four major iron castings. These are the crank case, provided with feet, the cylinder and water-jacket embodying a wet liner, a cylinder-head and a sump. The overall dimensions of the engine are 3 ft. 4 in. high, 2 ft. 3 in. long and 2 ft. 2 in. wide. The complete weight of the engine is 600 lb. with approximately 5 cwt. of castings. Fig. 1 shows a sectional view of the engine. Instructions were that as far as possible existing plant must be utilized. The design was such that component parts could be more or less successfully produced on plant available. From the outset a very close liaison existed between the design department and the foundry.

As far as the foundry was concerned it meant that these castings had to be produced on a limited range of moulding machines as follows:—(*a*) Two turnover machines with a jolt load of 300 lb., and a pattern table maximum 30 in. by 21 in.; (*b*) two pin-lift machines with a jolt load of 400 lb., and a pattern table maximum 30 in. by 21 in.; (*c*) two pin-lift machines with a jolt load of 200 lb., and a pattern table maximum 26 in. by 18 in., and (*d*) three small machines for snap-flask work. The full range of castings is made on these pneumatic moulding machines in a very limited range of moulding boxes, with semi-skilled labour.

Raw Materials

With a few exceptions the components are made in grey iron. Due to the variation in section and service it is necessary to use two grades the percentage compositions of which are as follow:—

	Mix I	Mix II
TC ..	3.3	3.4 to 3.5
Si ..	1.5	2.0 to 2.2
Mn ..	0.8	0.5 to 0.7
S ..	0.1	0.1
P ..	0.3	0.6 to 1.0

Mix I is used for the castings of thicker sections where soundness and pressure tightness are important. These castings include the flywheel, crankcase, piston, liner, cylinder-head, water-jacket and gear wheels. Fig. 2 is an unetched photomicrograph of a section of a liner showing the graphite structure. The charge for this mixture is composed of steel, hematite, refined iron and scrap, and tensile strengths of between 18 and 20 tons per sq. in. are obtained. The second mixture is used for all other grey-iron castings.

The connecting rod is made in whiteheart malleable having a composition as cast of TC, 3.2; Si, 0.35 to 0.40; Mn, 0.3; S, 0.15, and P, 0.06 to 0.07 per cent. The charge is made up entirely of steel, hematite and shop scrap. The annealing cycle for the malleable castings consists of a heating period of about 24 hrs. up to a temperature of 1,000 deg. C. which is maintained for 120 hours, the cooling taking about 30 hours. The carbon content on a section ½ in. thick is 0.25 per cent. after treatment. Fig. 3 shows a typical example of the microstructure of the malleable iron. This specimen was cut from the centre of the web of the connecting rod. Other malleable castings on the engine include the starting-handle, rockers and various levers and flanges. For the small-section castings the silicon content is raised to between 0.5 and 0.6 per cent. Typical test-

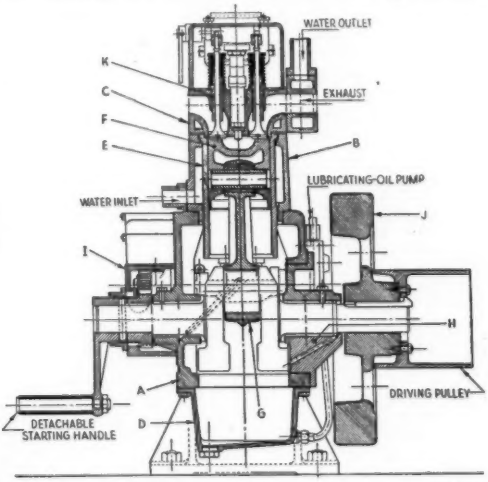
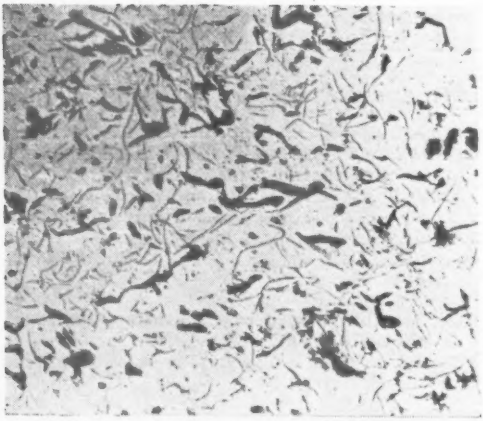


FIG. 1.—*Sectional View of the Engine, the making of castings for which is described.*

A. Crankcase.
B. Water-jacket.
C. Cylinder-head.
D. Sump.
E. Cylinder-liner.
F. Piston.
G. Connecting-rod.
H. Main-bearing Housing.
I. Gear-cover Housing.
J. Flywheel.
K. Valve guide.

* Paper presented to the North-eastern section of the Scottish branch of the Institute of British Foundrymen. The Authors are on the staff of Dens Iron Works, Arbroath.



FIGS. 2 AND 3.—*Typical Photomicrographs of Castings Produced; Fig. 2 (top), Diesel-engine Liner. × 60 mags., unetched. Fig. 3, Centre Web of Malleable Iron Connecting-rod Casting. × 300 mags.*

results are tensile 22 to 24 tons per sq. in., elongation 7 to 10 per cent., Brinell hardness 120 to 140. Analyses of all mixtures are carried out daily.

All castings are made in greensand. The sand is naturally bonded, the additions being Scottish rock sand, a local sea-sand and coal-dust. The test results obtained are as follow: Green-strength, 7.5 to 8.5 lb. per sq. in.; permeability, 35 to 40; moisture, 5.5 to 6.5 per cent.; loss on ignition, 7.5 to 8.5 per cent. Moisture estimations are carried out twice an hour and green-strength and permeability are taken hourly. Loss on ignition is done regularly and a screen analysis is carried out every three weeks. Control is exercised on the basis of the permeability results and screen analysis and the sea-sand addition is varied to maintain permeability. In order to ensure a good finish, the loss on ignition is considered an important routine test. As an additional check, the amount of coal-dust used per day is carefully controlled.

The core-sand is made from a mixture of Levenseat No. 2 and a local hill sand. The addition of the local sand was made during a time when difficulties were experienced with the supply of washed silica sand and the practice has been continued. Good results are obtained and an appreciable financial saving has followed. The sand is bonded with 2.7 per cent. of an oil-impregnated powder. Typical test results are as follow:—Green-strength, 2.0 lb.

TABLE I.—*Screen Analysis of New Sands (per cent. Retained).*

B.S.S. grading.	Rock sand.	Local sea sand.	Local hill sand.	Levenseat No. 2 sand
Mesh.				
8	0.2	—	—	—
10	0.2	—	—	—
16	0.3	0.2	—	—
22	0.5	0.2	0.1	0.1
30	1.0	0.4	0.3	0.6
44	2.0	3.9	2.1	8.5
60	4.2	25.3	10.9	24.1
100	47.3	56.2	47.1	48.5
150	22.6	13.4	30.9	16.1
200	3.7	0.3	5.8	1.7
Pan	3.8	0.1	2.6	0.4
Clay substance	14.2	—	0.2	—

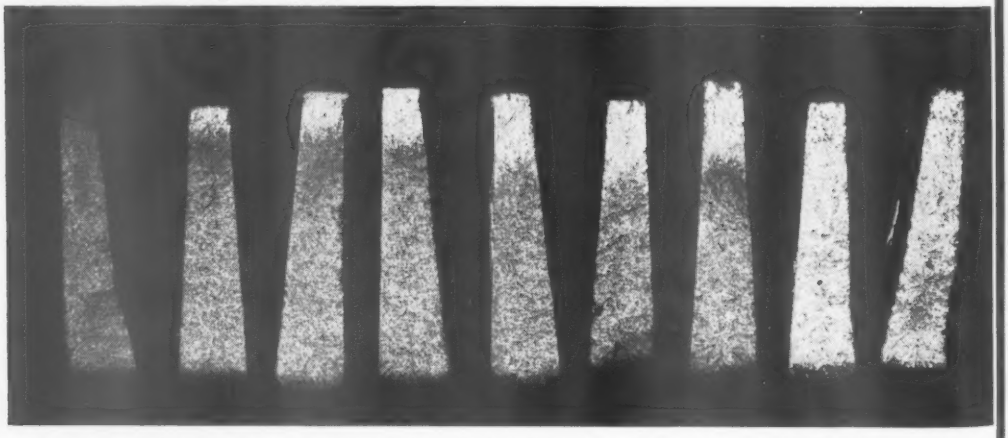
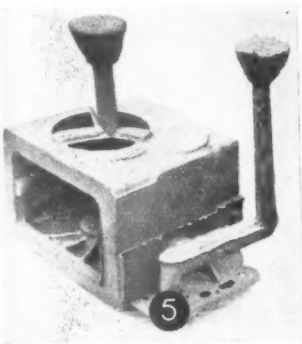
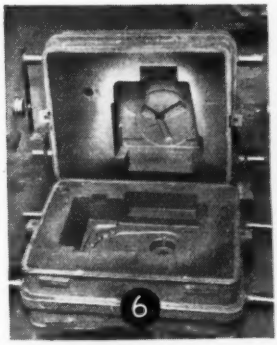
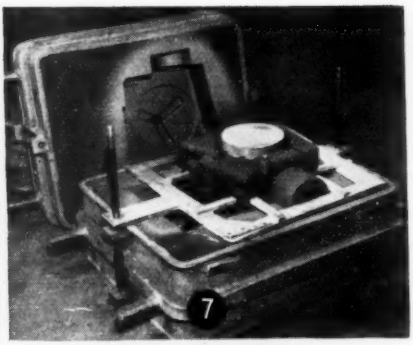
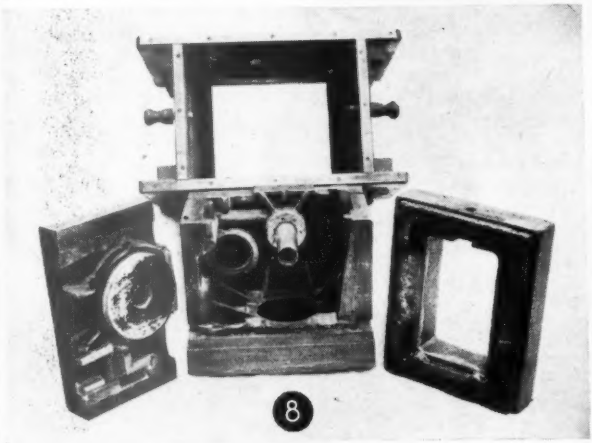


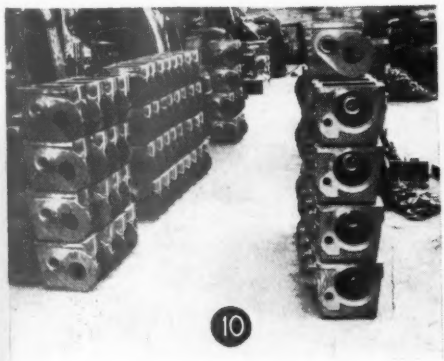
FIG. 4.—*Series of Chill Test-pieces, illustrating Changes in Composition of Metal obtained from Different Mixtures.*











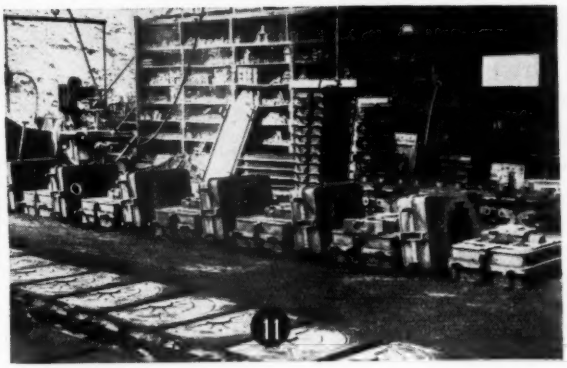


FIG. 5.—*Crankcase Casting showing the Gating Arrangements.*

FIG. 6.—*Half Moulds for producing the Crankcase Casting (shown before Coring-up).*

FIG. 7.—*Mould for the Crankcase during Coring-up, showing the Use of the Core Jig located on the Pin Centres.*

FIG. 8.—*Main Corebox for the Crankcase Casting.*

FIG. 9.—*Using a Pneumatic Hoist for Closing a Crankcase Mould; note the Slinging Arrangement.*

FIG. 10.—*Batch of Crankcase Castings after Machining.*

FIG. 11.—*Row of Crankcase Moulds, Cored-up and ready for Closing.*

FIG. 12.—*Water-jacket Casting with Runners and Feeders.*

per sq. in.; dry-strength, 800 lb. per sq. in.; permeability, 120; moisture, 3.5 per cent. Table I shows a screen analysis of the sands used. The drag half of the flywheel mould is faced with a layer of quick-drying core-sand to eliminate the possibility of scabbing. In addition, the moulds for the crankcase and flywheel are sprayed with a mould-coat and fired. The resulting castings need very little cleaning.

Melting Practice

The melting unit is a single cupola which is used daily. It is lined to 26 in. giving an average melting rate of 2¾ to 3 tons an hour. All the metal is transported in hand ladles holding about ¾ cwt. Through this cupola are put both malleable and grey iron, during a melt. The malleable iron is charged first followed by the first grey-iron mixture, having 1.5 per cent. silicon and, finally, the softer grey-iron mixture with a silicon of 2.0 per cent. is melted. A chill-test is used to determine when the alteration

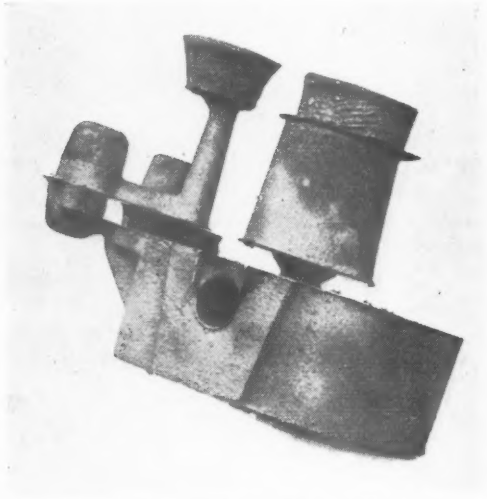


FIG. 13.—*Cylinder-head Casting, also with Runners and Risers.*

FIG. 14.—*Mould for the Cylinder-head Casting with Internal Cores in Position.*

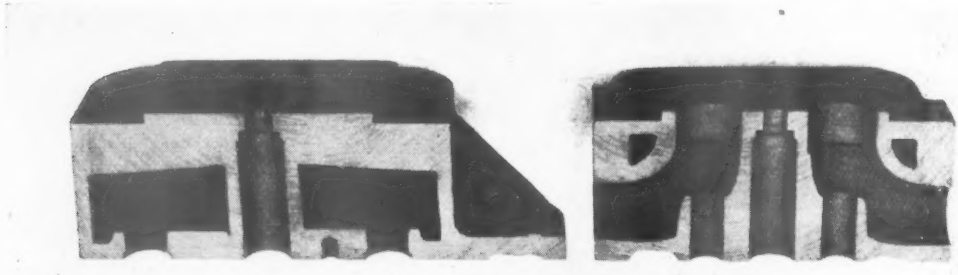


FIG. 15.—*Two Cylinder-head Castings after Sectioning to show Soundness.*

FIG. 16.—*Cope and Drag Pattern Equipment and Two Half-moulds for the Sump Casting.*

FIG. 17.—*Cylinder-liner Casting, showing Running and Feeding Arrangements.*

in metal composition occurs. As soon as the change is imminent, pouring of malleable castings is stopped, the metal is inoculated in the ladles with ferro-silicon and the thickest castings, *i.e.*, the fly-wheels, are cast. The rest of the first mixture follows, the chill depth being maintained at about ½ in. by the addition of ferro-silicon. The change to the softer mixture is again determined by the chill-test. Fig. 4 shows a series of test-pieces illustrating the changes in composition.

Moulding Practice

Crankcase.—The pattern equipment for the crankcase is arranged on twin pattern plates mounted on a pair of turnover machines. The moulding box measures 28 by 22 by 10 by 10 in. The gating arrangement and the casting are illustrated in Fig. 5. It is necessary from the moulding point of view to use a core behind the gear-cover flange and advantage is taken of this to incorporate a runner-bar in the core on the joint of the mould. The metal is poured through the cope to this runner-bar and then down through the core to the bottom of the casting. It was found that this prevented turbulence during pouring and eliminated trouble which was experienced with scabbing on the bottom face. The complete mould is shown in Fig. 6. Fig. 7 shows the core jig which is located from the pin centres with the main core in position. The main core is made from the core-box shown in Fig. 8.

Fig. 9 shows a mould about to be closed, making use of a 10-cwt. pneumatic hoist single-cylinder type. A point of interest may be the slinging arrangement for turning the mould. Fig. 10 shows a batch of these castings, fully machined, lying in the machine shop. Fig. 11 shows a series of these moulds ready for closing.

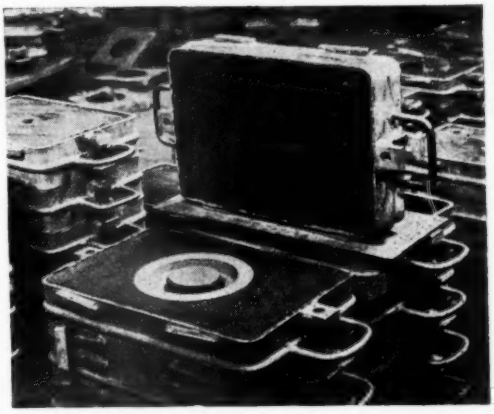


FIG. 18.—*Cylinder-liner Mould ready for Closing.*

Water-jacket.—Fig. 12 shows the water-jacket casting complete with runners and feeders. This casting is made in multi-part boxes, 18 by 12 by 4 in., on a pin-lift machine. The main core is located at the bottom of the drag. A cover core is utilized to locate the top of the main core and two pencil gates are dropped through it. An off-feeder at this side of the casting is sufficient to ensure soundness throughout.

Cylinder-head.—Fig. 13 shows a cylinder-head casting complete with runners and risers. This casting is made in 18 by 12 by 4 in. multi-part boxes on a pin-lift machine. Fig. 14 shows a mould with the internal cores in position. The body-core consists of similar halves abutting against each other

FIG. 19.—*Piston Castings, made in Pairs, with Common Runner and Feeder.*

in the mould. This arrangement greatly simplifies core-making and brings these cores within the capacity of a small bench-type core-blowing machine which is available. A cover-core goes over the top of the casting. It will be appreciated that mould and core-setting are all in the drag and this gives ample opportunity for ensuring that the mould is clean. Fig. 15 shows two castings sectioned.

Sump.—Fig. 16 shows cope and drag pattern equipment and two half-moulds for the sump casting. Two castings are made in a box 28 by 16 by 10 by 5 in. on a turnover machine.

Liner.—The next illustration (Fig. 17) shows a cylinder-liner casting with its running and feeding arrangement. The mould for this casting is made in 18 by 12 by 4 in. multi-part boxes, four for drag and one for cope. The barrel core is located in the drag and held in position at the top by a ring core. The metal is taken through the cope to a circular runner-bar and through four narrow ingates. The length of the liner is 9 in. and the feeder ring $2\frac{1}{8}$ in. Fig. 18 shows a mould ready for closing.

Piston.—Fig. 19 shows two piston castings with a common running arrangement. These castings are made in 18 by 12 by 4 in. multi-part boxes on pin-lift machines, two for drag and one for cope. The casting is moulded complete in the drag part with a cover core for location.

Connecting Rod.—Fig. 20 shows a connecting-rod casting with runners and feeders. This casting is run through a feeder at the big-end with an off-feeder at the small-end. Being a white-iron casting, a large proportion of feeder metal is necessary to ensure soundness and the yield for this casting is 33 per cent. Fig. 21 shows a finished mould. Out of each batch of these castings one is taken and subjected to a bend test after annealing as shown in Fig. 22.

Bearing housing.—A casting of the main bearing housing is shown in Fig. 23. This again is made in the multi-part boxes. The metal is run through a feeder and a cover core is used to take out the body of the casting. Fig. 24 shows a mould about to be cored-up.

Gear-cover.—A mould of the gear-cover casting is shown in Fig. 25. The pattern is $4\frac{1}{2}$ in. deep and it is necessary to raise the joint $1\frac{1}{2}$ in. so that it can be moulded in boxes 28 by 16 by 5 by 5 in.

Flywheel.—The flywheel casting, 22 in. dia. and weighing 170 lb., is shown in Figs. 26 and 27. This casting is made on a turn-over machine in 24 by 24 by 4 in. multi-part boxes. The casting is all formed below the joint line and a core is used for the deep recess as shown in Fig. 27. It is poured through two double ingates diametrically opposite. The feeding of this wheel is carried out by two cylindrical risers which are surrounded by exothermic moulding material. A mould coat is sprayed on the mould and skin-dried.

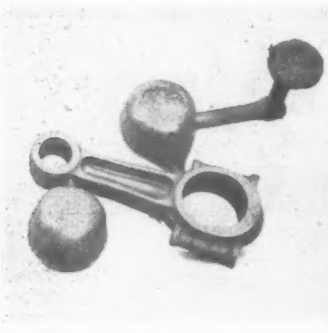


FIG. 20.—*Connecting-rod Casting made in Whiteheart Malleable Cast Iron.*

FIG. 21.—*Top and Bottom Half-moulds for the Connecting Rod.*

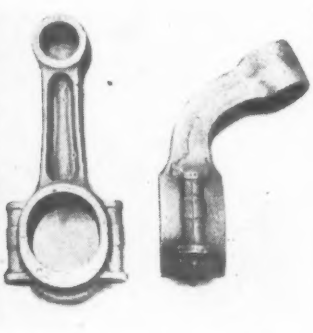
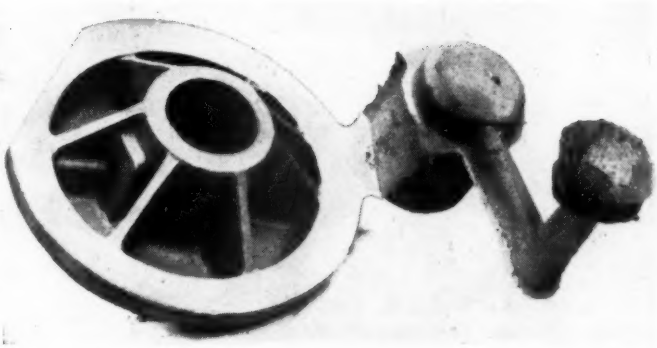


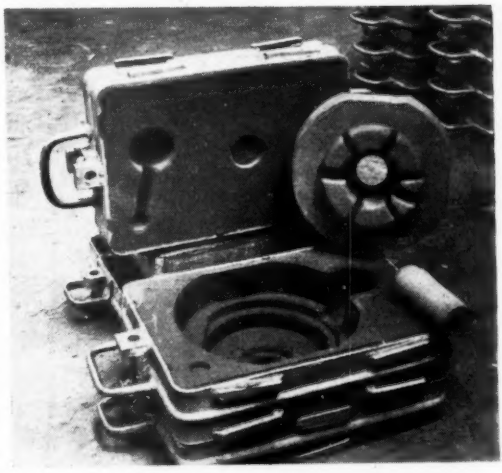
FIG. 22.—*Bend Test carried-out on Connecting-rod Casting after Annealing.*



FIGS. 23 AND 24 (*centre*).—*Main-bearing Housing Casting showing Running and Feeding Arrangement as well as Cores and Half-moulds.*

Tappet.—Fig. 28 shows the pattern equipment for the tappet castings. These are moulded in 18 by 12 by 4 in. multi-part boxes on a pin-lift machine. The tappet face needs to be chilled and the chills are located by means of a print. A section of the tappet showing the chilled face is illustrated in Fig. 29.

Details.—The last illustration (Fig. 30) shows groups of the smaller castings which are also required. On the left are grey-iron castings and on the right malleable-iron castings. Most of these castings are made in snap-flasks.



Conclusion

In conclusion it is interesting to note that in exactly one year from the day the design department put pencil to paper, 150 engines were manufactured and sent out from the factory. The Authors believe that an important factor in this achievement was the very close co-operation between the foundry and the drawing office. The wisdom of the decision of the Board of management is reflected in the successful production and performance of the 2C Diesel engine and the subsequent orders which have followed, particularly from abroad. Many engines have now been exported to Greece, Syria, India, Siam, Brazil, Pakistan and East Africa. An improved version of this engine is now in production known as the 2C A engine. It will be appreciated that this industrial engine has many possible applications. Automatic generating sets for electricity and pumping sets are now being manufactured by the company.

Acknowledgments

The Authors wish to express their appreciation to the directors of Alexander Shanks & Son, Limited, and Shanks Ironfounders, Limited, for their permission to give this Paper. They also acknowledge their indebtedness to Mr. A. M. Gibson and Mr. John Arnott for preparing the illustrations, and the staff and employees of Shanks Ironfounders, Limited, for their co-operation; without their help and enthusiasm this Paper would not have been written.

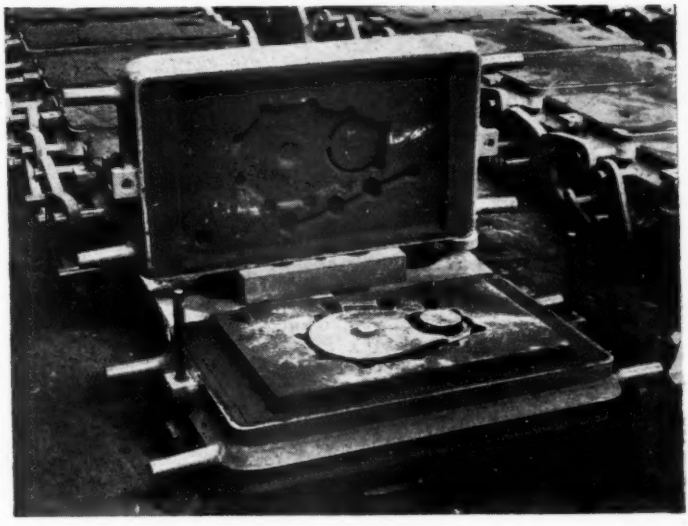


FIG. 25.—*Mould Parts for Producing the Gear-cover Casting.*

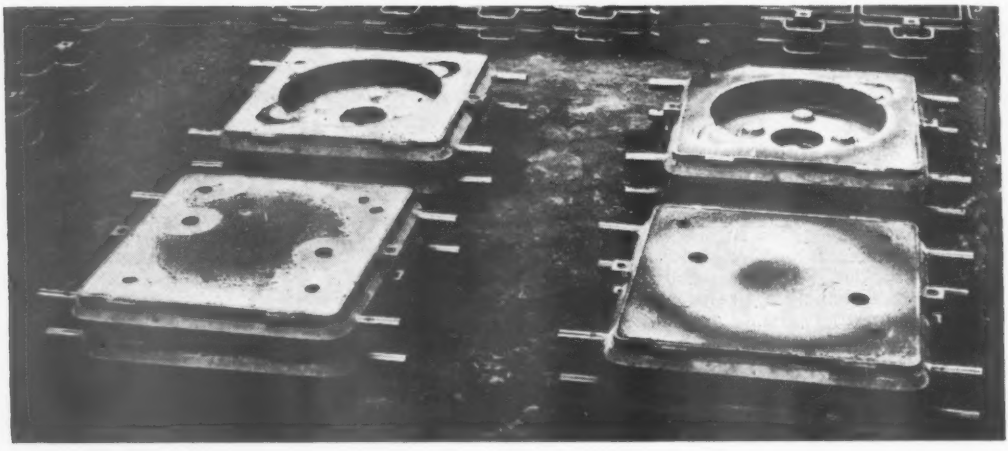
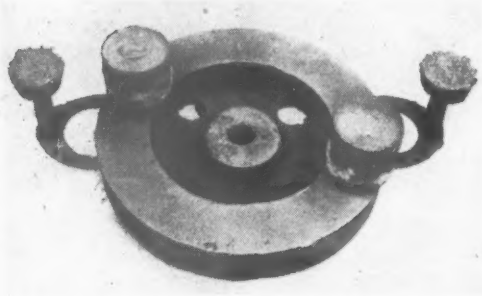


FIG. 26 (TOP).—*Moulds for the Flywheel Casting; Note that the Deep Recess is formed by a Core.*

FIG. 27 (LEFT).—*Flywheel Casting, showing Method of Running and Risering, casting weight* 170 *lb.*

FIG. 28 (RIGHT).—*Pattern Equipment for Tappet Castings.*

FIG. 29 (BOTTOM).—*Fracture Appearance through the Chilled Face of Tappet Castings.*



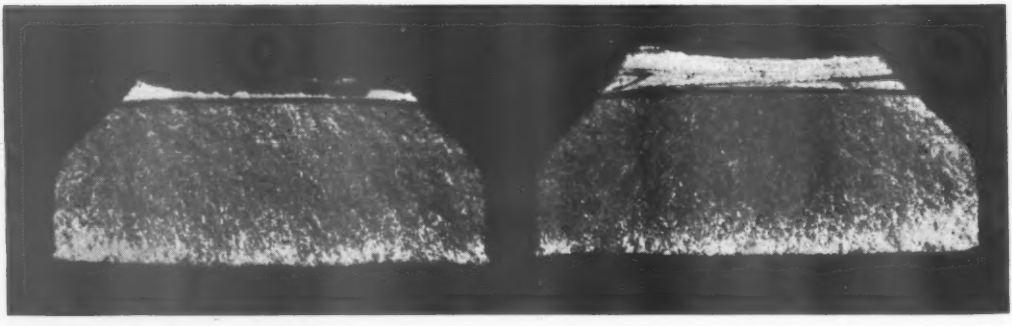


FIG. 30.—*Groups of Smaller Castings required for the Diesel Engine; left, Grey Iron and right, Malleable Iron.*

Accident-Prevention Conference in London

A London industrial groups' accident-prevention conference will be held in the Caxton Hall, London, S.W.1, on Monday, February 25, from 10.15 a.m. to 4.30 p.m., and the following is the draft programme:—

Morning session—(chairman, Major-General B. K. Young, C.B.E., M.C., director-general of the Royal Society for the Prevention of Accidents) "Management and Accident Prevention," by Sir Ewart Smith, M.A., M.I.Mech.E., technical director of Imperial Chemical Industries, Limited, and "Accident Prevention in Relation to Common-law Claims," by Mr. J. C. Corrin, F.C.I.I., assistant general manager of the Midland Employers' Mutual Assurance, Limited.

Afternoon session, 2 p.m.—(chairman, the Rt. Hon. Lord Llewellin, P.C., C.B.E., M.C., president of the Royal Society for the Prevention of Accidents) "Some Medical Aspects of Accident Prevention," by Dr. K. Biden-Steele, M.D., D.P.H., H.M. Medical Inspector of Factories, and "The Trade Unionist and Accident-prevention," by Mr. J. O'Dowd, J.P., divisional organizer, Iron and Steel Trades Confederation.

Admission will be free by ticket, which readers may obtain by writing to the honorary secretary of the London Industrial Co-ordinating Committee of the Royal Society for the Prevention of Accidents, Miss B. P. Park, c/o J. & R. Fleming, Limited, 146, Clerkenwell Road, London, E.C.1.

Third Mechanical Handling Exhibition and Convention

The third Mechanical Handling Exhibition and Convention is to be held at Olympia, London, from June 4 to 14. The exhibits of about 170 firms, occupying 250,000 sq. ft., will include conveyors, elevators, hoists, stackers, cranes, mechanical loaders and shovels, fork-lift trucks, industrial trucks, coal-handling plants, overhead runways, aerial ropeways, grain-handling plants, wagon tipplers and ancillary equipment. Amongst the Papers to be read at the Convention is one on foundry mechanization, sponsored by the Mechanical Handling Engineers' Association.

British Standards Institution

The monthly information sheet for December, 1951, issued by the British Standards Institution, 24, Victoria Street, Westminster, London, S.W.1, lists, among *New Standards Issued*, Handbook No. 13:1951, Mechanical tests for metals (17s. 6d.), reviewed in the JOURNAL on January 3; B.S. 1804:1951, Parallel dowel pins of steel (2s.), and B.S. 1808:1951, Sizes and recommended layout of commercial forms (3s.), in which a range of standard sizes is given for the following commercial forms—letter-heads, order forms, invoices, delivery notes or packing slips; invoice delivery note and advice note set; statements of account.

In *New Codes of Practice*, C.P. 131.101:1951, Flues for domestic appliances burning solid fuel (5s.); C.P. 327.402:1951, Staff location systems (3s.), and C.P. 407.101:1951, Electric lifts for passengers, goods and service (4s.) are listed. *Amendment Slips Issued* include P.D. 1308, Amendment No. 1 to B.S. 1172/4:1944, Deoxidized and arsenical coppers, while under *Future Publications* are quoted B.S. 1121, part 23:1951, Methods for the analysis of manganese in iron and steel, absorptiometric method (1s.); B.S. 1728, Parts 2 and 3, Magnesium and zinc in aluminium and aluminium alloys: Zinc (2s. each), and B.S. 1814:1951, Marking system for grinding wheels (2s.).

AN ORDER for four new cargo vessels, valued at £3,000,000, has been placed with Lithgows, Limited, Port Glasgow, by A. F. Klaveness & Company, Oslo.

OWING TO A SHORTAGE OF STEEL, workers at the Solihull works of the Rover Company, Limited, motor-car manufacturers, have been put on a three-day week. It is hoped to resume normal working shortly.

THE NEW HIGH-PRESSURE GAS MAIN from Reading to Oxford has been completed. The main is intended to take 2,000,000 cub. ft. of gas a day as a supplementary supply to relieve the extreme pressure upon the Oxford works. A statement issued by the chairman of the Southern Gas Board, Mr. O. R. Guard, on January 7 said that by the end of January it would be possible to pass 1,000,000 cub. ft. from Reading to Oxford daily, and towards the end of the year the full 2,000,000 cub. ft.

Scottish Foundry Trade Review

From our Scottish Correspondent

Falkirk's pre-eminence in the light-iron-castings export market was seriously threatened after the war when a nettle-bed of restrictions prevented local foundries from wooing back those markets which they were forced to neglect during the years of conflict. It is, therefore, gratifying that the outstanding feature of the year now ended has been a marked revival in the export trade. New markets have been found and others are being explored, and the prospects for the ensuing year are that exports will continue to take an increasingly large share of production. In other respects, the year past has been less one of spectacular development than of steadily-maintained prosperity. Problems there have been, but the rewards have been greater than in any year since the end of the war. The trend towards increased mechanization of foundries and the development of new ranges of products, which were marked features of the post-war readjustment period, have continued during the year, but there has been a slowing-up in the drive.

Production

Production generally has exceeded last year's totals, and in some foundries has passed the pre-war output figures. Yet even mechanization and the speed-up caused by growing standardization has not enabled production to overhaul orders, and several large firms are operating on a back-log of between four and six months. Turning to a detailed examination of the year's features, it may be noted that the considerable rise in export trade has been accomplished in the face of difficulties caused by tariff and currency barriers and growing shortages of raw materials. South America offers a tempting and lucrative market but it is, unfortunately, largely sealed-off by currency restrictions. South Africa attempted to insulate itself by imposing an import embargo, but one or two local firms have overcome the difficulty by starting Companies in that Dominion. Though tentative approaches have been made to the dollar market and some progress has been made in the Scandinavian and Low countries, the bigger part of the overseas market has lain with Australia and New Zealand from whom generous orders have been received. During the year, foundry units have been developed in both of these Dominions and their existence will eventually have a bearing on the production of the parent foundries in this country. It is not unlikely, however, that the tag, "Falkirk made" will continue to be a valuable selling agent in a discriminating market.

Mechanization

The technological revolution which has overturned traditional methods of manufacture in the ironfounding industry during the post-war period has largely accomplished its ends during the year under review. Mechanization, which won only a grudging acceptance from the largest foundries at first, has now extended its influence into all but the very smallest of the 35 foundries in the central Scotland area and most firms have installed mechanized plants. During the year, Smith & Wellstood, Limited, Bonnybridge, brought into production a new, completely mechanized foundry, capable of producing all but the largest castings in the firm's range of products. Plans for an extension of the new foundry are under consideration. Grahamston Iron Company, Limited, who have been in the van in the progress towards increased mechanization, brought a new machine-moulding plant into operation in August last. The Carron Company have a new mechanized pipe-making plant almost ready to go into operation and several other foundries are in the process of completing schemes of improvement.

Development of new lines on the research benches continues, but the dramatic departures which were a feature of the immediate post-war years in the development of solid-fuel heating appliances cannot now be looked for so frequently, since production is fully occupied with existing lines for the time being. Yet the development of these new lines, coupled with the increased use of machine-moulding, has led to a heightened regard throughout the industry of the research and laboratory sections and new methods of application are not being neglected.

Shortages

The main difficulty which has faced the industry during the year under review is the growing shortage of such raw materials as pig-iron, steel and copper. With the increased tempo of the rearmament programme, further cuts in these basic materials are expected. Component parts, too, have been getting increasingly difficult to secure. Power-cuts have proved a hindrance to all-out production, but several of the larger foundries have installed, or are installing, their own Diesel generators to keep the essential processes going during these cuts. Shortage of skilled manpower continues to be a disturbing factor, but there are prospects that the various apprentice training schemes now in operation will eventually help to overcome this handicap.

Rearmament, apart from the side-effect in causing shortages of materials, has had less of an impact on the industry than was expected at the beginning of the year. A certain proportion of normal production lines is being diverted from customary markets to the Government departments concerned with rearmament, but, so far, little direct part in the supply of war material is being played by local foundries. With fuel continuing scarce, there is every prospect of an assured market for many years to come for the fuel-economy units now being produced locally. There is a body of Scottish opinion which maintains that progressive development of hydro-electric resources will eventually displace solid fuel as a heating agent, but this eventuality, should it materialize, need not alarm the industry, since no doubt it would rapidly adapt itself to the new medium. The prospect of a revival of German ironfoundry concerns presents, however, a problem which is potentially more serious. With the rising costs of production in this country and the obvious intention of the German manufacturers to get back into the market, keen competition may develop in the coming years.

On the whole, however, prospects were never brighter. A study of the financial accounts of the principal ironfounding groups indicates that, in terms of finance, 1951 has been a most successful year. And if the present Government can implement its promises in house-building, an activity which absorbs a considerable part of Scottish production, there is every prospect of full employment throughout the industry for many years to come.

THE FEDERATION OF SECONDARY LIGHT METAL SMELTERS has announced that, following the increases in the Ministry of Supply's prices for raw materials and in production costs, its members find it necessary to increase the maximum selling prices of the undermentioned alloys for deliveries on and after January 1, 1952, as follow:—

L.M.1, from £129 per ton to £157 per ton; L.M.2, from £151 to £175; L.M.4, from £135 to £163; L.M.6, from £162 to £186. Deoxidizing sticks, 85/90, are raised from £115 per ton to £143 per ton.

Some Present-day Practices in Patternmaking*

I.B.F., London Branch discuss Mr. B. Levy's Conference Paper

At the October meeting of the London branch of the Institute of British Foundrymen, held in the Waldorf Hotel, Mr. L. G. Beresford was in the Chair and, following the usual formal business, mentioned that they were glad to welcome to London two French foundrymen, Mr. Terrioux and Mr. Rodien. A branch visit was being arranged to Paris in the summer of 1952 when they hoped to meet them again under different circumstances.

Introducing Mr. B. Levy, the lecturer for the evening, who was to give his Paper "Some Present-day Practices in Patternmaking" which had previously been given at the Newcastle Conference, the Chairman said he was the principal of a patternmaking firm and he was sure the Paper he was to give would be of general interest to everyone.

[Mr. Levy then gave his Paper, which was illustrated by lantern slides.]

Opening the discussion, a MEMBER asked about the hardness of some of the synthetic resins used for patternmaking and moulding. He understood when cured they had a hardness that approximated that of cast iron.

MR. LEVY replied that the comparison was intended to refer to the original material he had used and tested; with regard to other resins, he had no information as to their hardness.

MR. HOLLAND asked how plastic patterns were anchored to the aluminium plate to keep them from moving during the ramming of the mould.

MR. LEVY answered with a diagram on the blackboard showing how the plastic pattern was recessed in the plate and screwed on, the screws being slightly burred over where they protruded on the back of the plate.

Costs and Sizes of Plastic Patterns

MR. A. WHILES asked how the cost of a resin pattern compared with that of a metal pattern.

MR. LEVY said he could not give a direct percentage comparison because one had to take into account how much work there was in the pattern itself. Referring to the small samples exhibited, in those cases the phenolic pattern was about a quarter of the cost of an aluminium pattern and gave a considerably greater saving over a fully-machined cast-iron pattern. Broadly speaking the resin pattern was about a third of the cost of the same job in metal.

MR. WHILES thought resin patterns should be much cheaper on account of the fact that they were more liable to damage.

MR. LEVY added that, apart from cost, suitability for moulding had to be assessed and he favoured plastic patterns in this respect.

MR. A. A. MATTHEWS wanted to know to what size it was possible for a plastic pattern to be made and used. The sizes exhibited were definitely small, and he wondered whether the larger sizes would stand up to wear.

MR. LEVY said that was a question which could only be answered by experience, and experience with very large plastic patterns was not available. The small types on view were satisfactory but, as the matter was still developing, he would not like to recommend plastic patterns for anything much larger. For instance, he would not like to recommend a plastic pattern for a large hand-moulded pump body because there was a considerable amount of extra wear and tear on any large job—abrasion, for example, was considerable—and while the surface hardness of the resin was good, it did not have a high resistance to abrasion, especially under Sand-slinger conditions. For ordinary jolt-squeeze moulding, there was no reasonable size for which one could not use resin, but he would not recommend *loose* plastic patterns in one piece of such a size as would fill an 18-in. square moulding-box. He emphasized "one piece," for unless the pattern was held to a metal plate it would not stand up to the rapping and handling in the foundry.

On being further asked what his experience had been in the States, Mr. Levy replied that he had only seen one or two small jobs made in plastic material. However, he understood they had used sizes up to a large gear housing, a job of the order of 24-in. dia. by 18 in. deep.

Entrapped Bubbles

MR. D. W. MORRIS asked if there was any expansion or contraction in the curing process of plastic patterns, and was there any trouble with entrapped air bubbles? Further, would any accidental heating in the foundry cause extensive damage to the pattern?

MR. LEVY said there was a shrinkage of approximately 1 in 200, which on small jobs could be ignored; on large work suitable allowance would have to be made. Entrapped bubbles caused one of the production snags, and at the moment it was a matter of trial and error to eliminate entrapped bubbles in the resin casting. One did not have to worry too much about them with phenolic resin because, if a bubble came in an awkward place on the pattern, there was no need to scrap it. One merely filled the hole by dropping in a little of the uncured resin with an extra amount of hardener

* Paper originally presented to the Annual Conference of the Institute of British Foundrymen at Newcastle-upon-Tyne, and printed in the JOURNAL, July 19, 1951.

in it. It made an excellent union which it was almost impossible to separate from the original material.

As to the effect of heat, he had already mentioned that the material was a chemically stable compound, but he would not say it could not be burnt. How much heat had Mr. Morris in mind?

MR. MORRIS explained that he meant a pattern accidentally left lying near a fire and not the effect of molten metal.

MR. LEVY, continuing, said lying near a fire would not do any harm as the resin would stand up to 80 deg. C. without any reaction whatsoever unless it was subject to that heat or excessive heat for a considerable length of time. Under such conditions it would start to blacken and gradually disintegrate.

MR. A. TALBOT said he had talked to some of the practical men who had accompanied the Productivity Team on their visit to America and from them he understood that the phenolic resin or the plastic patterns were not satisfactory, and in America they were discarding the system. On the present occasion, apparently, the idea of resin patterns was being fostered.

MR. LEVY, replying, said this statement of American deprecation of plastic patterns was news to him. When he was in America, just over three years ago, enthusiasm was growing for plastic patterns. He would be very interested to know why American foundrymen considered that resins were no good. He had exhibited a job which had been in foundry use and on which the customer had saved some 75 per cent. of the patternmaking costs. He could not see why, if they were saving money on the job and producing good castings, the method should not be considered satisfactory.

Pressure-cast Aluminium Matchplates

MR. TALBOT said he had further been given to understand that if a plaster cast was made, as was often the case, it was an easy matter, by a simple machine which had been demonstrated in America to the Productivity Team, to pressure-cast a matchplate pattern in aluminium, which gave a greater life and just as much accuracy and sharpness of detail as could be secured with phenolic resin.

MR. LEVY said pressure-casting of matchplates was one of the methods which he went to America to investigate—more so than plastics. At the time he had been very interested in pressure-cast aluminium patterns of every type. On his return to this country he learned that the difficulty from the British point of view was in importing the special plaster. Several patternmakers in England had tried the process, but they had all found certain difficulties in casting aluminium in gypsum-plaster moulds. The difficulty seemed to arise with the grade of plaster which he understood carried a modicum of asbestos. If the special gypsum mix was not used, aluminium casting in a plaster mould was doomed. He agreed that there was much to recommend the idea, but at the same time he had mentioned that some fine results could be obtained by good, close sand-moulding methods. Nevertheless, the accuracy, mouldability and finish were not comparable with the resins. The cost of the elaborate equipment that was necessary for aluminium pressure castings was another factor to be borne in mind. As it had to be imported, the plaster cost much more than in America and the economies of the process became decidedly unfavourable to us.

Future Development

A MEMBER asked if the resin could be applied to the more intricate type of pattern, or had it to be confined to patterns of the block type?

MR. LEVY said resin was particularly suited to the more intricate type of pattern—the more intricate, the better the results. As regards wear on the fine ribs and edges, it might be found that was a little more extensive than on a metal pattern, but nevertheless the sharpness of detail and the cheapness by comparison with reproducing a metal pattern was very favourable.

MR. E. DAYBELL said he thought it quite time that they decided whether resin patterns were good or not. In his opinion they were definitely good and had a future; he gave his support to their adoption. Having seen them in use, he could not imagine why they should have thrown out the idea in the United States, but suspected it might be because they had not got the right technique the first time and had not persisted with it. That sort of thing had happened here on occasion. There had been difficulties with cracking in some cases but a resin had been found which did not crack and had therefore been successfully developed.

One point which had not been mentioned was that a resin pattern could be drilled and tapped so that it could be fastened into the pattern-plate. He had seen patterns used up to 18 in. long by 12 in. wide quite successfully. In favour of the resin pattern it should be remembered that no elaborate equipment was needed in the patternshop; there was no great delay in producing it and the precision of reproduction was good.

MR. LEVY mentioned that an American firm had recently sent him a specification of a method of fixing plastic patterns into a metal plate by the use of Babbitt metal in a concealed groove.

Several Patterns from One Mould

A MEMBER said he supposed Mr. Levy knew of a firm in America which still concentrated on plastic patterns. His firm had had patterns of that type in use for a year now, and they were preferable to wooden patterns in as much as if a customer sent in one pattern and a number of working patterns was required, it was quite simple to cast them from the original in plastic material, which was a definite advantage. As regards economics, he had been waiting to hear someone mention the possibility of getting more than one pattern from one mould. It was being done in the States, he believed.

MR. LEVY said he had got up to three castings

out of one plaster mould on simple shapes, but usually preferred a separate plaster each time. The real advantages were realized when working on complicated shapes, and on economic grounds.

The MEMBER asked if there was any way of doing a complicated job and being able to produce several from the same mould.

MR. LEVY said that point depended on the material of the master pattern, whether it was practicable to make a mould from which it was possible to produce many plastic pattern castings. The compound used for the mould was itself a plastic; it was a proprietary article and was rubber-like when cast. It was quite feasible to obtain a number of phenolic-resin pattern castings out of a mould made of that material. However, the material was only suitable for use with a metal master-pattern, and was quite unsuitable for use on wooden patterns, as its melting point was rather high.

Convertible Patterns

MR. G. PIERCE suggested that members should be very careful with multiple patterns of the type mentioned in the Paper and illustrated by the case of the cylinder block. He assumed multiple patterns were recommended to meet cases which might come along from time to time requiring a one-way job, or a two-way job, or an eight-way job, all by using the same basic pattern. The picture they had been shown was of a multiple pattern something like a Diesel eight-way job. They might want to convert that to a four-way job, and he suggested that the patternmaker would have an enjoyable time making that conversion—and founders would foot the bill. It was not a conversion which could be given to the moulder to do. It had to go to the patternmaker, and by the time he had converted it the expense would be heavy. If founders had such a class of work to do, he suggested it was better to have a separate pattern for each type of casting rather than one multiple pattern which had to be converted. Otherwise, he thought members would find in the end they had spent much more money on patternmaking than on the castings.

MR. LEVY pointed out as a patternmaker he was all in favour of "one pattern—one job," but the customer's point of view had to be considered, which in the case mentioned favoured the convertible pattern. There was another side to the matter, namely, the cost of timber. To-day, good patternmakers' pine cost in the order of £400 a standard and in a pattern of the size under consideration there would be something like £300's worth of timber. On top of that was the cost of labour. For additional variations in cylinder number, there would be a somewhat reduced cost for each of the other patterns they would have to make. But, added together, for the sum there represented, he suggested, a founder would be able to have a great many conversions carried out on a multiple pattern and still show a saving.

Plaster Patterns

MR. ORR wanted to know if Mr. Levy had had any experience of plaster patterns, either on their own or as a filling for a thermo-setting resin.

MR. LEVY said he had, but only for one-off jobs. They had used simple plaster patterns for producing a rough master casting of a very large brake-drum, up to 26-in. dia. They had used plaster for a hollow shell with a wall thickness of about ½ in. It might be imagined that it would fall to pieces upon handling in the foundry and that might have been the case if it had not been reinforced with very coarse canvas known as scrim. By such reinforcement, the rather fragile plaster cast was serviceable for casting purposes, but not for any considerable quantities. For one-off jobs it had a considerable use, particularly where the cast could be ground, filed and machined up afterwards, because there was always variation with plaster patterns. As to plaster used with a resin, he had had no experience of this, but such a combination might be of use.

MR. A. LOVE pointed out that in such cases the plaster tended to become brittle, although the hardness of the mixture was an advantage. As the hardness increased so also did the brittleness.

Summing up a number of questions and observations which dealt with this particular aspect of patternmaking, MR. LEVY said he sometimes trembled to think what might become of patternmakers. They were using very elaborate machinery and it was evident, if filled resins would do all that a first-class metal pattern would do, the position might be difficult. At the same time, it should be recognized that different types of material and classes of pattern-equipment now in use all had their proper application in the industry. It had to be accepted that every material had its good points and its limitations in both patternmaking and foundry practice.

Rubber-like Moulds for Patterns

THE CHAIRMAN (Mr. L. G. Beresford) said he had been interested in the reference to rubber moulds in which to cast the resin. It was probably well known to most of them that rubber moulds were being extensively used in the jewellery trade for the casting of low-melting-point metals, and they reproduced the pattern to a remarkable degree. They were actually being used for the casting of filigree patterns which was, he thought, much more difficult than some of the patterns with which members would have to contend. If they would stand up to centrifugal casting, which was what they were being used for, he saw no reason why they should not stand up to innumerable quantities of resin patterns in the same way.

MR. LEVY agreed they would stand up, but, he added, there were certain inherent practical difficulties to overcome. One, which he believed was quite important, was the actual making of the substitute material. It was not rubber in the real sense, it was a substitute, another plastic. There was difficulty in making the "rubber" mould without bubbles and having made it, to produce a pattern casting which was true. Obviously if one had an elastic mould such as rubber there would be a question of repositioning after flexing for extraction.

THE CHAIRMAN said that, obviously, the mould would be vulcanized before use.

Some Present-day Practices in Patternmaking

MR. LEVY agreed that was true, but there was still some elasticity which represented a danger. It might be overcome, but so far he had had no personal experience with it.

MR. W. WILSON, who proposed a vote of thanks to Mr. Levy, said at the last general meeting there had been requests for papers from the body of the hall. Among these had been one for practical papers. A practical paper from a craftsman had now been given. Anyone who had tried to write a paper knew the amount of work that had to be put into it and when a craftsman wrote a paper it often represented a lifetime of study and experience. They appreciated the time and study Mr. Levy had given this paper; as practical men he was sure they had also appreciated the way the many questions had been answered. He was pleased to be able to propose a very hearty vote of thanks to Mr. Levy for both the Paper and the manner in which he had dealt with questions.

MR. A. R. PARKES, seconding the vote of thanks, said he was pleased to do so for quite a different reason from that given by the proposer. Foundrymen were always complaining that there was not sufficient co-operation between the designer and the man who had to make the castings. That had been going on for years. To his mind it was the patternmaker who held the key to the problem. He was the man who had to interpret the designer in terms of practical foundrywork. Mr. Levy had shown by his Paper that he was not only a master patternmaker, but one who took a pride in his craft and was anxious to provide that link and co-operation.

When put to the meeting, the vote was carried by acclamation.

Foundry Personnel

The table printed below shows foundry labour according to type of worker (at September 29, 1951) and is taken from Bulletin No. 66, issued by the Council of Ironfoundry Associations:—

Type of worker.	Men and boys.	Women and girls.		Total.
		Full-time.	Part-time.	
	1.	2.	3.	
Coremakers	9,646	3,684	383	13,713
Core-stove attendants	1,242	32	2	1,276
Patternmakers	7,371	3	—	7,374
Cupola chargehands	2,480	—	—	2,480
Cupola helpers	4,283	9	1	4,293
Casters and pourers	4,540	2	—	4,542
Moulders	43,232	123	1	43,356
Fettlers	11,696	446	55	12,197
Annealers	912	48	1	961
Casting inspectors	1,757	459	46	2,262
Foundry foremen and assistants	3,955	23	—	3,978
Crane drivers	2,641	66	—	2,707
Storekeepers	1,110	26	2	1,138
Labourers (sundry), *e.g.*, patternshop, coremakers', moulders', fettlers' and scrap-yard labourers	25,350	489	60	25,899
Other Ironfoundry workers (including maintenance but excluding clerical)	15,555	1,329	239	17,123
Total	135,770	6,739	790	143,299
Administrative, technical and clerical workers	5,699	2,706	215	8,620

Politics and the Steel Industry. Problems of the iron and steel industries came under discussion at the monthly meeting in January of the West-Midland Liberals. Arguments turned mainly on steel in relation to the housing programme; the mounting difficulties of the small-scale manufacturer; the growing quantity of steel being produced by competitor countries notably Germany, while Britain's output showed signs of declining; and the small prices paid for scrap so that recovery was barely worthwhile economically.

Fear was expressed that the iron and steel industries were in danger of being made a political background instead of being regarded as the lifeblood of British industry, without which no national economic stability could be realized. Mr. R. E. Nutt, the Wellington delegate, expressed the opinion of the group that, in spite of all the attacks made on the industry, its prices had always compared favourably with those of other great producers, especially America. There was general acceptance of the fact that although the country was in overwhelming need of steel, it was impossible quickly to get all that was required for the vast armament and export programmes, together with home demands.

Recruits for West Bromwich Foundries. In an effort to attract new entrants to the industry, the West Bromwich Joint Foundry and Recruitment and Training Committee has decided to adopt the apprenticeship and training scheme in operation at Walsall. This provides for five-years' progressive training, designed to produce skilled craftsmen. Other facilities are technical instruction on one day each week at Kenrick College, practical work at the Foundry Craft Training Centre and the annual award of a craftsman's certificate to successful apprentices or learners.

For some time, employers and trade-union representatives have been meeting to discuss recruitment and training. Mr. V. W. Williams, the local youth employment officer, who is honorary secretary of the committee, said last week: "We are confident that now a recognized scheme of training is operating in West Bromwich, boys entering the foundry industry will have every opportunity of promotion to the full extent of their ability."

QUALCAST, LIMITED—Mr. F. J. A. Toft has retired from the board.

Craftsmanship of Output*

By F. E. Rattlidge, A.M.I.P.E.

The Author, in presenting a Paper to the Lincoln section of the Institution of Production Engineers, prefaced his remarks with an introduction of which the following is a slightly-abridged abstract. It enumerates personal impressions gained as a member of the Brassfoundry Productivity Team visiting the United States and attempts a realistic interpretation of reasons why American productivity is highly advanced. The rest of the Paper is not reproduced here, as it deals with the machining and jigging of brass components, a subject in which foundrymen are only indirectly concerned.

The material gathered by the Brassfoundry Team and presented in the recently published Report†, is by no means confined in application to any one trade, but is of general interest to all concerned with light engineering. The collective experience of the team was increased by pre-embarkation visits to brassfounders in this country, and this enabled fair comparisons to be made between British and American practice during the tour. The team saw no examples of true flow- or belt-production outside the foundries in either country. The unanimous opinion of the team after visits to American workshops was that American operators were doing more work per hour or day, not necessarily by working harder, but by working more effectively. Statistics show that over the past 50 yrs. the collective result of their average increase in productivity of 3 per cent. per annum against the British average of 1½ per cent. has resulted in the present gap between machine and labour productivity of average companies in both countries. As a result of the visit with the team, it seems desirable to hang meat on the bare skeleton of statistics, and give flesh and blood reasons for it.

The reasons can be grouped under three headings:—(*a*) The *means;* (*b*) the *method*; and (*c*) the *motive*.

The Means

By " means," reference is, of course, made to the provision of necessary production equipment. It is stated that American operators have at their command an average of seven horse power as compared with three in this country, and during the visits the impression received was that they welcomed the opportunity of working two machines where this was possible, since they benefited directly. There was very close co-operation between the machine-tool companies and the users of their products, and the outcome or the cause of the mechanization that is the result, is that " skills " are rapidly being transferred from operators to machines. Precision work and complicated cycles could easily be performed by " green " or semi-skilled labour on appropriate machines. The most interesting development in the design of production equipment was the wide use of standard parts such as self-feed drill heads and index tables that could be assembled in various ways to produce a composite machine, giving a desired series of operations on a component.

The ancilliary equipment manufacturers also worked very closely with the companies requiring their products, and often converted a bright idea from that company into something tangible, or provided an answer to a demand. If applied successfully, the device, unit or gadget was usually commercialized and sold as a standard product. Consequently, there is available in the U.S.A. a wealth of useful ancillary devices for the conversion or improvement of new or old equipment into speedier production machines, and generally speaking, these devices are very popular with company executives and operators, and are widely used.

The Method

Although there were many tangible results of applied ideas that in themselves increased output, the Author submits that if there is anything to learn from the Americans in this respect, it is not any one or a number of these devices, but the way they were used, how they were applied and where, and above all the outlook and attitude of the people who have applied them.

The issue of roller-skates to messengers, perhaps illustrates this, although, the team did not visit a company using them. Rarely did the team see anything that was the outcome of technical brilliance, and it became increasingly evident that it was the knowledge and correct application of many simple devices, varying in their nature from work-trays to special machines, that in total represents one of the main reasons for the present American production leadership.

It is *here* that the high skills normally expected to be found amongst British craftsmen are applied, the difference being that the men skilled in this art hold executive positions in American companies. Although, on their own admission, Americans are short of craftsmen, they use the word as referring only to " operator level "; actually, they *do* have highly-skilled men at all grades *from foremen upwards*— men skilled in the art of applying ideas and getting output.

Close Liaison

Proportionately, they have in America as many small companies and family businesses as there are in this country, so that a comparison can be made on this score, and nowhere during the visit did the team see a motion-study department, or development

* Abridged title for a Paper " Craftsmanship of Output as Applied to the Processing of American Brassfoundry Work." The Author is production engineer, Evered & Company, Limited, Birmingham.

† " The Brassfoundry " Productivity Report available from the Anglo-American Council on Productivity, 21, Tothill Street, London, S.W.1. Price 7s. 6d., post free.

Craftsmanship of Output

shop, as such. What was seen, however, was " down-to-earth horse-sense " applied on the shop floor and not through any specific department created for the purpose. They had the gift of getting quickly to grips with problems, and applying unconventional methods of solving them which were measured by their effectiveness and not by the way they looked. Not so much " job satisfaction " as " result satisfaction."

It is this attitude of mind and its obvious results that was so marked, and which prompted a search for a title to convey this outlook, as " the art of getting things done and quickly," in relation to the output of the factory. Since it is perhaps unorthodox, it qualifies for the unorthodox description, " Craftsmanship of Output." The attitude referred to is, of course, by no means limited to America and is evident in many of the most efficient companies in this country. The reason the point has been stressed, however, is because in America it is evident in *all* factories of *all* sizes, and is no doubt the mainspring of their efficiency of output.

The Motive

Enlarging on the operators' motive for achieving output, which is, it is submitted, the outcome of that attitude mentioned under the second heading, " method," reference is, of course, made to financial incentives, and it is a characteristic of that country that conditions at the present time are conducive to the application of them.

Income taxation in America is not so often blamed as being a brake on production, but of greater importance is that the value of effort expended in terms of possessions is more tangible, certainly for the operatives. It has recently been stated that direct financial incentives are going out of fashion in the U.S.A. and that operators prefer a static wage, working harder for promotion to a higher grade of pay. This inclination towards security-mindedness is rather interesting, and it is questionable whether their incentive schemes will be quite as effective, when a component produced is not directly related in terms of money to the purchase of, or part-payment on, the car, washing machine, television set or refrigerator. One was forced to the conclusion by the operators' rate of working that the effectiveness of their financial incentive schemes was due to this fact of " seeing " their effort in terms of possessions, either in a short-term through hire purchase, or a longer term through savings. In any event, the availability of the goods provides the motive, and the desire for them creates the incentive to work.

Less Class Consciousness

This team visited many companies within the brassfoundry industry and was told that the working conditions studied were typical of other industries, too. Both workmen and executives commenced at 7.30 a.m., had 30 min. for luncheon, and were free to go home at 4 p.m. in the afternoon. The team witnessed this leaving at the end of the shift on more than one occasion, and it was quite a worthwhile sight. An opulent-looking fellow in a light suit and smoking a cigar would collect his shining limousine from the car park (often as large in area as the factory) and then drive off on his 10- or 20-mile journey home, amongst many others similarly attired and equally prosperous in appearance. In reply to questions that the company seemed to employ a lot of managing directors, the members of the team were told that they were simply chaps who had left the corebench or machine, changed in the changing rooms and collected their cars. From appearances, at any rate, executives, staff and many operatives were indistinguishable and this elimination of the " we " and " they " attitude is an essential part of the incentive.

Driving Urgency

This and many other similar instances created in the lecturer's mind the doubt that the word " incentive " was strong enough to convey the full implication behind Americans' efforts. Perhaps " urge to produce " would give a sharper impression, prompted by the " urge to own," encouraged and probably created by the " urge to sell " of the salesman, who offers " necessities " that we still consider luxuries.

Before enlarging on some of the technical items mentioned in the report, it is as well to admit that there is a characteristic difference between the management and operatives of their companies and ours, and it is essential to appreciate not so much the reasons but the results of these differences, as so many direct comparisons are made between the two countries without due consideration to them.

Pioneering Spirit

The cause of the difference is due to the age of the country. They are a young go-ahead nation still imbued with the pioneer spirit of adventure, which is apparent in most Americans of all ages. The result is a young, virile outlook, a willingness to have-a-go, and an attitude of mind that says " why not? " instead of " why? " Of course, this youthful outlook brings with it, generally speaking, many of the indiscretions of youth; a certain lack of maturity and balance: two of the things which Britain rightly prides itself in possessing. The lecturer submitted, however, that these latter qualities do not lend themselves readily to the exploitation of ideas, quick action and success with the " impossible," as do the youthful characteristics mentioned earlier. Americans are more suited mentally for the suggestion and acceptance of many schemes and ideas that could not be adopted in this country due to a different way of life.

It is also true that the conditions in their country are more favourable at the moment for the creation of the personal characteristics promoting enterprise and that industrial conditions are more favourable to their encouragement. Consequently they have more people in all types of industry less frustrated.

The lecturer then showed a series of slides, outlining two major aspects:—(1) Technical interest, and (2) applied craftsmanship of output. They were presented under the following group headings:—Hot pressings and forgings; machining and inspection; finishing; assembly and testing; and mechanical handling and storage.

Second Generation Looks at the Foundry Industry

Extracts from Mr. S. P. Russell's Presidential Address

Mr. S. P. Russell, D.F.C., in his inaugural address to the East Midlands branch of the Institute of British Foundrymen, after dealing very forthrightly with local affairs, continued his remarks by posing the question as to how matters compared to-day with 1923, when his father, Mr. S. H. Russell, was president:—

He was told that at that time producers of pig-iron and coke sent their representatives round to try and *sell* their products; that enough skilled moulders were available to satisfy the demands of the industry, and that if trade fell off in one part of the country, moulders were prepared to move themselves and their families to fresh fields, houses apparently being more than sufficient; that there was considerable competition for boys to get into foundries; that there was a strong feeling of responsibility throughout foundries and a considerable pride.

Comparisons being odious, he had no wish to labour the point, but it could hardly be claimed that the industry was much better off 28 years later. Were there any bright spots? What about working conditions? They were improving vastly year by year with mechanical contraptions taking much of the hard labour out of the job, associated with better buildings, providing men with more pleasant surroundings to carry out what must under any conditions be an arduous occupation. As for the output of iron castings, it would appear that it was up by 1,000,000 tons over pre-war days and probably considerably more in relation to 1923.

Quality

To-day quality was certainly more consistent and the strength of iron which could be made available was substantially increased. Occasionally, however, one came across a casting produced 25 to 30 years ago and was impressed by the visual quality of the iron it contained. The Institute itself had achieved greater status and extended its activities. The research associations had also expanded and made valuable contributions to the knowledge of the industry. It would therefore be fair, he thought, to say that in all the spheres which were in the control of the industry it had made great strides and that the shortcomings were due to difficulties which beset it on a national and political scale.

Future

The president, in referring to the future, deemed it to be "not too bright," because of the shortages of moulders, boys, labourers, pig-iron, and coke. These seemed to thwart any effort towards greater production. Answering the question as to what could be done about it, he pointed out that pig-iron and coke would presumably—in the Government's good time—become available again. Skilled moulders in their own good time would presumably die. There just were not enough boys available—however attractive the industry was made—and the low birth-rate period of 16 years ago was to blame for that.

If there were not enough skilled moulders, and if there were insufficient boys, what was to be done? Do without them, of course! Somebody had got to produce the jobbing work for the engineering industry. Why could not the industry do without boys? The apprenticeship system was largely outdated. It went back to the days when a craftsman sold the skill of his trade to a boy who paid to learn. Too much of an apprentice's time was still spent in fetching cups of tea and wasting time, and, although people like Mr. Haynes, who spoke to the branch recently, were getting plenty of boys and teaching them to produce intricate 4-ton castings when they were 18, he appeared to be one of the very few who could do it.

Taking the Skill Away

Had a moulder necessarily to be trained to carry out every type of moulding practice from core-making, through bench moulding, green-sand, dry-sand, loam and strickle work, and all the rest of the bag of tricks? Why could not men be trained to specialise in a certain job and do that job well? The Americans did it and got away with it. He felt that the trade unions would object to it, but since the Institute's meetings were no place for such matters, he left the subject, saying that he was sure that in time less-skilled operators would have to come.

Foremen's Status

The question as to who was going to train the men coming into the industry would, he supposed, be answered by the foremen—those overworked and (according to the Grey Ironfounding Productivity Team) those underpaid heroes who took the brunt of the present-day troubles. There had never been greater opportunities for good men to come forward from the ranks, and the fact that so few of them were prepared to do so was a reflection on the status of the job. It was up to managements to correct that impression and to build up the morale of their foremen as much as possible.

The foundry industry had a great record of progress and achievement, and, although he had touched on several points which gave cause for alarm, he felt perfectly confident that in the future, as in the past, ways and means would be found of overcoming them.

Moulding-box Standard. There is now available for comment a draft British Standard for "Dimensions of Foundry Moulding Boxes," number CN (MEF) 6725. This may be obtained by subscribing members and by interested parties on application to the British Standards Institution, 24, Victoria Street, London, S.W.1. The latest date for the receipt of comments is February 18.

House Organs

Perkins News, Vol. 8, No. 2. Issued by F. Perkins, Limited, Peterborough.

This issue contains an excellent coloured picture of Peterborough in 1831, together with a really interesting article on its history and growth. The general make-up and illustration are of such a character that they combine to make this house organ one of the best issued by engineering companies.

Albion Works Bulletin, Vol. 5, No. 8. Issued by John Harper & Company, Limited, Willenhall.

As usual, this issue contains an account of the last meeting of the Joint Production Committee, and the reviewer wonders whether, in the light of modern terminology, this should not be changed to the Joint *Productivity* Committee. One question discussed, namely, the reduction in the breakage of castings, falls nicely into newer nomenclature. It is pleasing to note that 257 employees have qualified for a "Never Absent, Never Late" competition. This is to be associated with a general lowering of absenteeism, which during November was reduced to 4.68 per cent.

Amongst new appointments announced is that of Mr. W. T. Law, who is to be sales representative in the North of England. Naturally, the newly-acquired foundry at Poole is accorded some space.

The Bowater Papers, Vol. 1, No. 2. Published by The Bowater Paper Corporation, Limited, 9, Park Place, St. James, London.

It is generally assumed that the Press is the largest consumer of paper, yet the reviewer understands that it takes second place to industrial undertakings where packaging and correspondence eat up enormous quantities. Thus this magazine does not address itself to any particular group, but to the general public. Quite often the reviewer has eulogised American publicity matter, yet nothing so far received has excelled this magazine for either typography or colour printing, only perhaps American layout is more attractive. There is catholicity in the contents of the issue for its pages are designed to interest those liking information on geography, cartology, history, colour printing, mechanics and many other subjects. Recipients of this magazine can indeed count themselves fortunate.

Publication Received

Journal of Research and Development, Vol. 4, No. 3, December, 1951. Published by The British Cast Iron Research Association.

This issue is mostly devoted to the lighting and ventilating of foundries. It contains six papers which were presented to a conference covering these subjects organized by the Association. A paper from Sweden has been included, and is of real interest as showing the lengths to which the foundry industry in that country has gone to suppress dust. Sweden, however, is a very cold country in winter and the foundries are almost hermetically sealed shops and hence the greater attention paid to the subject. The one paper not included in the Conference is "Load/Deformation Curves in Dried-sand Specimens and their Relation to Expansion Defects," by Mr. R. G. Godding, a member of the research staff.

Development Plans for Brazil

Orders to be Placed in Europe

The recommendations regarding economic developments in Brazil made by the Mixed Commission for Economic Development, which met recently in Rio, must be submitted to both the United States and Brazilian Governments for approval in accordance with the agreement signed by the Brazilian finance minister in Washington. Brazil will provide funds to meet the local expenditure entailing the carrying out of the approved projects and the World Bank and the Export-Import Bank will advance an equivalent sum in foreign currencies to cover the cost of essential imports. It is certain that important orders will be placed in Europe in this connection.

Considerable disappointment has been expressed in Brazilian business circles at the report that exports of British steel to Brazil are to be curtailed or suspended. During the 12 months of the Anglo-Brazilian Agreement, which ended on June 30, the value of imports of British steel into Brazil totalled £1,033,846. Brazil is now Great Britain's biggest customer in South America (exports to Brazil reached £43,300,000 in 1950, to Argentina, £38,700,000) and her orders will become more important if Britain can supply her needs and make reciprocal purchases in Brazil. Several European countries are doing so, paying somewhat higher prices in order to avoid the dollar zone.

Imports from Britain

In October, Brazil issued 916 permits to import British goods, valued at £3,131,640. Permits included automobiles and spare parts, £551,470; motor lorries and spare parts, £71,346; motor cycles, £41,512; bicycles, £120,108; Diesel motors, £87,732; industrial machinery, £341,816; tools and cutlery, £70,725. During the first half of October licences to import from all sources included iron and steel, in sheet form, etc., £338,006; iron and steel pipes, £101,193; wire, including a small proportion of brass and copper wire, £287,574; steel wire rope, £12,873; other metals in sheet, ingot form, etc., £547,354. Of these items Britain is to supply iron and steel sheet, etc., £30,218; iron and steel pipes, £9,239; wire, £12,597; other metals, £40,715. As regards the remainder, most of the sheet steel will come from the United States, but large orders for wire have been placed in Belgium, and for pipes and steel wire rope in Germany.

Germany Exports More Machinery

The re-entry of Germany as a major exporter of machinery on the world market is revealed by the rising proportion of machinery in her total export trade. Exports of machinery rose from 14 per cent. of the total German exports in 1950 to 15.9 per cent. in the third quarter of this year. The volume of machinery exported has almost doubled in the course of a year, from a monthly average of 26,000 tons in 1950 to a monthly average of 45,000 tons in 1951. Agricultural machinery accounted for 19 per cent. of the total exports of machinery, followed by machine tools, 17 per cent., and electrical machinery, 11 per cent. The value of exports of machine tools reached a monthly average of D.M. 36,000,000 this year.

A progressive expansion is reported in the exports of locomotives, office machinery, pneumatic equipment, and textile and leather-working machinery. In the third quarter of this year exports of German machinery were valued at D.M. 208,000,000 compared to D.M. 164,400,000 in the third quarter of 1950.

Spanish Iron and Steel Institute

Foundry Subjects discussed in Madrid

A general meeting of *Instituto del Hierro y del Acero* was held in Madrid from December 10 to 15. The translation of the title is the "Institute of Iron and Steel," but this Institute is not organized on the same lines as the British Iron and Steel Institute, although it drew considerably on the experience of the latter prior to formation. To repay this debt, an official party from the Iron and Steel Institute was invited to the meeting. The Institute is of fairly recent formation and this is only its second meeting, the first having been held some three or four years ago. Delegates were welcomed at the opening session by the president of the Spanish Institute, Alfonso de Churruca, who is also an honorary vice-president of the British Iron and Steel Institute.

The Spanish Institute is also somewhat similar to the British Iron and Steel Research Association, or more, perhaps, to the French foundry organization, in so far as it is supported by a levy on industry and maintains a large paid staff of engineers and research workers. It is controlled by a director, who is responsible to a board on which representatives of industry and of various Government departments are represented.

As mentioned, the meeting was held in Madrid and as there are no metallurgical works of any size within many miles of this city, the programme was entirely devoted to Papers, discussions on Papers and reports of various committees. It is hoped that the next meeting will be held in some metallurgical centre such as Bilbao, where works visits could be easily organized.

Many invitations had been sent to foreign specialists to give papers at this meeting and in all there were 14 papers contributed by non-Spanish authors. Only one of these was by an English author, Mr. F. C. Evans, of John Miles & Partners (London), Limited, the majority being of German and French origin.

As regards the Papers themselves, there was little of novelty in the foreign ones, most of these being of a review nature. Among contributions of Spanish origin were also many of the review type and even more of a theoretical nature. There were several Papers, however, of considerable interest as they dealt with actual experience and research on Spanish conditions and materials. Several papers dealt with the study of Spanish sands in an attempt to find suitable materials for steel and iron foundries.

Technical Papers Given

Papers which may be of interest for reference are listed below, together with a brief résumé of their contents.

Report of the Moulding Sand Committee.—This report contained a map of Spain with the known sources of moulding sand and details as to their properties, mostly presented in graphical form.

Study of Five Moulding Sands.—A very well-documented report giving the properties in graph form of five sands prepared under different conditions.

Preparation of Sand Mixtures for Moulding.—Results of practical foundry experiments with bronzes, iron and steel or the utilization of mixtures containing bentonite.

There were three reports on the iron ores of Spain, the first on sources and their location, the second on sintering and the third an interesting paper describing apparatus and giving the results of tests on the reducibility of various Spanish and extraneous ores.

The Institute, by its constitution, also has a section which deals with non-ferrous metals, but apart from one or two review-type papers on the casting and melting of light alloys there were none of outstanding interest. The social side of the meeting, apart from private functions, was confined to an opening church service, the inaugural meeting, a reception at the Institute's head offices, a concert, and a final dinner. Facilities were also provided for visiting the newly rebuilt University City on the outskirts of Madrid, a visit to the Prado picture gallery, and some visits to laboratories of such State institutes as the Instituto Nacional de Tecnica Aeronautica. All these were well arranged and attended and provided facilities for meeting many members of the Spanish iron and steel industry. At the dinner and dance, some 400 members, visitors and their wives were present.

U.S. Company's Purchase

In 1922 the Wolverhampton Corrugated Iron Company, Limited, entered into agreement with the H. H. Robertson Company, of Pittsburgh (U.S.A.), under which the British company built a new factory in its Mersey Ironworks, Ellesmere Port (Ches.), for the manufacture of Robertson protected metal sheeting. At first operated as a department of the sheet works, over the past 30 years the business has steadily developed and the H. H. Robertson Company has built up a separate organization handling its products.

The H. H. Robertson Company has now purchased the factory in which its protected metal sheeting and other products are made, together with certain additional land and buildings for expansion. The company now operates independently from the Wolverhampton Corrugated Iron Company under the title of Robertson Building Service—H. H. Robertson Company.

The direction and management of the Robertson Building Service are unchanged, and employees in the factory will continue in the service of H. H. Robertson Company. The Wolverhampton Corrugated Iron Company continues in occupation of the remainder of the Mersey Ironworks.

THE WIDE-SCALE SCRAP DRIVE which has been undertaken since the beginning of the year by the iron and steel industry in collaboration with scrap merchants is to be intensified, in view of the gravity of the steel scrap situation.

Discussions have taken place between the Minister of Supply, Mr. Duncan Sandys, officials of the scrap drive organisation of the iron and steel industry, and the president, chairman, and members of the National Federation of Scrap Iron, Steel and Metal Merchants. The Minister has indicated that he will give full support to measures undertaken by the industry or scrap merchants to increase supplies.

1952 Production Census to be Simplified

The Census of Production to be taken in 1953 in respect of the year 1952 is to be simplified. Forms will contain fewer questions than in any previous census and "sampling" will be introduced for the first time. These changes, which have been made after consultation with the Census of Production Advisory Committee, will reduce the burden on industry very substantially and permit the greatest possible economy in the Census of Production Office at the Board of Trade.

The census will cover all producing industries as before and returns will be required from all firms over a certain size in each trade. A "sample" will be taken of smaller firms, however, which means that the majority will not be required to make a return. The information obtained from the sample will permit early estimates to be made of certain important aggregates such as total sales, materials used, stocks, and capital expenditure for each trade. The introduction of sampling for 1952 is facilitated by the fact that details of output and materials were obtained in the census of 1951 and can accordingly be dispensed with for the year 1952. This information could not be obtained in sufficient detail by sampling methods, owing to the complexity of the national industrial structure.

The statutory form of return will include questions on working proprietors; average employment during the year; wages and salaries; plant, machinery and vehicles; new building work; total materials and fuel purchased; work given out; stocks at the beginning and end of the year; total output; and transport payments. No detailed analyses regarding output, materials purchased, and employment will be required. As a further economy, the sample inquiry into capital expenditure carried out by certain Government departments in 1950 and 1951 will not be made, as the information will be quickly available from the sample census.

Further details of the statutory census form are being sent to trade associations. Any firm in the field of production requiring further particulars about the census for 1952 should write to the Census of Production Office, Neville House, Page Street, London, S.W.1.

Aims of Steel Rationing Scheme

Following criticism by certain sections of industry of the first allocations made under the steel rationing scheme, which comes into force on February 4, the Government has restated the aims of the scheme. In face of the national steel deficiency estimated at 1,500,000 tons in the present year, the mounting claims of defence and the export drive had made it necessary to introduce a system of allocation based on the priorities of national needs. Under the scheme the needs of the basic industries such as fuel, transport, and power, and the claims of the defence programme and the export drive will be met first and the brunt of the cuts will necessarily be borne by the home market. The coal industry, one of the nation's principal steel users, is to be given top priority.

Three main causes for the steel shortage are cited by the Government. The first is the reduced level of domestic production consequent on the heavy fall in the imports of German scrap and the shortage of imported iron ore. Secondly, as tooling-up in the armament industries gains momentum, the demand for steel for defence work tends to rise steeply. Finally, the widening trade gap can only be closed by a drastic increase in the volume of our exports. Larger quantities of plant, machinery, and steel goods for overseas must be produced and this can only be effected at the expense of goods for the home market.

The statement added that strenuous efforts were being made to find means of increasing the total supplies by importing more ore and semi-finished and finished steel wherever possible.

Margam Running-in Delayed by Scrap Shortage

Because of the shortage of scrap, three 80-ton open-hearth furnaces have been closed at the Margam and Port Talbot works of the Steel Company of Wales, Limited. The Margam plant had been gradually running-in towards full capacity, and it had been hoped that more furnaces would be started to increase the flow of ingots to the mills.

Unfortunately, scrap stocks built up before operations began are now exhausted, and if supplies are not increased other furnaces at the plant may be closed.

Sir John Charrington (bending), vice-president of the Coal Utilisation Council, explains a point about a new type of solid-fuel appliance to Sir Hubert Houldsworth (centre), chairman of the N.C.B., at the council's training centre in London. Looking on are (left) Mr. Eric Bellingham, director-general of the C.U.C.; Mr. Lionel Locket, chairman of the London and South-Eastern Regional Committee, and Mr. R. J. Moffat (right), deputy director-general of marketing (planning), N.C.B. Numerous authorities have placed emphasis recently on the adoption for household use of modern fuel-saving devices as a major contribution to national fuel economy and many foundry producers of solid-fuel-fired appliances are co-operating with the C.U.C. by introducing designs of proved efficiency.

Personal

MR. J. R. RATCLIFF, B.SC. (ENG.), M.I.MECH.E., of K. & L. Steelfounders & Engineers, Limited, has been elected to the Board as engineering works director

MR. F. GEORGE, until recently a director of Zirconal Limited, has severed his connection with that firm to join the Board of Refractory Mouldings and Castings Limited, of Kegworth, Nr. Derby.

SALES DIRECTOR of Goodwin Barsby & Company, Limited, road machinery manufacturers, etc., of Leicester, MR. JAMES GAVIN has left by air on a two months' visit to India, where he will meet the company's agents, and carry out a market survey.

MR. F. J. A. TOFT, of Derby, has retired after 32 years' service with Qualcast, Limited, Derby Mr. Toft joined the staff in 1919, and during the next year became the firm's secretary. In 1942, he was elected to the Board and in 1947 became financial director.

MR. LESLIE GAMAGE, vice-chairman and joint managing director of the General Electric Company, Limited, accompanied by his wife, left London airport for Johannesburg on January 10, on the first stage of a business tour of South Africa and Rhodesia, lasting some ten weeks.

THE DEGREEE of Doctor of Laws will be conferred on MR. JOHN ROGERS, chairman of Imperial Chemical Industries, Limited, by the Senate of St. Andrew's University to mark the official opening, after reconstruction, on February 6, of Dean's Court as a university residence for research students.

MR. E. W. MARVILL, who has been associated with F. Perkins, Limited, Diesel-engine manufacturers, of Peterborough, since the formation of the Company in 1932, has been appointed general works superintendent. MR. H. B. HARRIS, who has been with the Company since 1939, has been appointed production manager.

FOLLOWING his retirement from the post of vice-chairman of the local directors of Newton Chambers & Company, Limited, ironfounders, etc., of Thorncliffe, near Sheffield, which he held for 10 years, MR. L. W. GWYN has been invited by the Board to become a director of two subsidiaries, Thorncliffe Coal Distillation, Limited, and N. C. Thorncliffe Collieries, Limited.

MR. R. H. CRUICKSHANK has been appointed buyer for G. & J. Weir, Limited, the Glasgow engineers, in succession to MR. CRAWFORD T. ROBERTSON, who retired at the end of last year. Mr. Cruickshank has been associated with the Company since 1923, with the exception of six years when he represented a steel company in Scotland. He became deputy to Mr. Robertson early last year.

MR. GERALD STEEL, managing director of the United Steel Companies, Limited, Sheffield, has been appointed a member of the Social and Industrial Council. The objects of the council, which has been set up by the Church Assembly, are to consider social, industrial, and economic questions referred to it by the Church or the Archbishops, and to help the assembly to form its judgment on such matters.

MR. GEORGE CLARK celebrated his 91st birthday on January 5. A director of the Bryan Donkin Company, Limited, plant engineers, of Chesterfield, Mr. Clark's association with the Company began over 58 years ago. He joined the firm at Bermondsey in 1893 and went to Chesterfield seven years later. From 1908 to 1949 he served as managing director, while from 1938 to 1949 he also occupied the position of chairman.

Obituary

THE DEATH is announced of MR. C. J. T. MACKIE, assistant secretary, Institution of Chemical Engineers and Chemical Engineering Group, Society of Chemical Industry.

MR. WILLIAM GILBERT SWAIN, a director of Lancashire Dynamo Holdings, Limited, and Lancashire Dynamo & Crypto (Mfg.), Limited, died on January 2.

FOR MANY YEARS managing director of Thomas Mitchell & Sons, Limited, machinery and scrap metal merchants, of Bolton, MR. THOMAS MITCHELL died recently at the age of 75.

ONE of three brothers who founded W. Shaw & Company, Limited, steelfounders, of Middlesbrough, MR. H. A. SHAW, chairman and managing director of the company, died recently at the age of 79.

THE DEATH is reported from the United States of PROF. JAMES ROBERTSON JACK, Professor Emiritus and retired head of the Department of Naval Architecture and Marine Engineering at the Massachusetts Institute of Technology. He was 86. Born and educated in Glasgow, Prof. Jack served his apprenticeship with Wm. Denny & Bros., Limited, shipbuilders and engineers, of Dumbarton, becoming manager of the company in 1914. He designed the first passenger cabin steamer with a turbine engine, which was built in 1901 and is still operating on the Clyde with its original machinery.

CLOSELY IDENTIFIED with Clyde shipbuilding for 60 years, during which he built many famous ships, Sir Thomas Bell died at Helensburgh, Dumbartonshire, on January 9, at the age of 86. Educated at King's College School and the Royal Naval Engineering College, Devonport, Thomas Bell went to Clydebank, which was then owned by James and George Thomson, as a draughtsman in 1886. He made rapid progress and was appointed resident director in 1909. John Brown & Company acquired the yard in 1899. Though he retired from the post of resident director in 1935, he remained on the board until 1946.

Increases of Capital

The following companies are among those which have recently announced details of capital increases:—

BENNIS COMBUSTION, LIMITED, Bolton (Lancs), increased by £50,000, in 5s. ordinary shares, beyond the registered capital of £175,000.

ENGINEERING COMPONENTS, LIMITED, Slough (Bucks), increased by £375,000, in 5s. ordinary shares, beyond the registered capital of £225,000.

ENFIELD FOUNDRY COMPANY, LIMITED, Waltham Cross (Herts), increased by £9,500, in £1 ordinary shares, beyond the registered capital of £1,000.

T. R. DOWSON & COMPANY, LIMITED, engineers, etc., of South Shields, increased by £34,000, in £1 ordinary shares, beyond the registered capital of £6,000.

WILLIAM MAKIN & SONS, LIMITED, steel and tool manufacturers, of Sheffield, increased by £24,000, in £1 ordinary shares, beyond the registered capital of £25,000.

CHARLES W. TAYLOR & SON, LIMITED, engineers, ironfounders, etc., of South Shields, increased by £64,000, in £1 ordinary shares, beyond the registered capital of £36,000.

OATEY & MARTYN, LIMITED, agricultural machinery manufacturers, of Wadebridge (Cornwall), increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

DEWRANCE & COMPANY, LIMITED, manufacturers of boiler mountings and valves, etc., of London, S.E.1, increased by £650,000, in £1 ordinary shares, beyond the registered capital of £600,000.

News in Brief

MAJOR FRANCIS D. LEY, joint managing director, of Leys Malleable Castings Company, Limited, Derby, will throw up the ball at Ashbourne's famous Shrove-tide football game, on the second day (Ash Wednesday).

PROMPT ACTION by the Staveley and Chesterfield Fire Brigades prevented any serious damage when a fire broke out at the works of the Staveley Iron & Chemical Company, Limited

A SHORTAGE of steel supplies has compelled Clifford Products, Limited, gas - cooker manufacturers, of Wednesbury (Staffs), to declare redundant 24 of its 160 employees. Mr. C. Purcell, general manager, stated that it was the first time that the company had had to take such action.

MIDLAND MEMBERS of the Institution of Industrial Supervisors, who included several from the local foundry industry, visited the "Birmingham Post and Mail" on January 9. They inspected the plant used in the production of a newspaper, and Mr. C. Farrall, works manager, addressed the meeting.

AN ALL-TIME RECORD OUTPUT was achieved by Follsain Wycliffe Foundries, Limited, Lutterworth, near Rugby, in 1951, representing an increase of 18 per cent. on the output for the previous year, it was announced by Mr. H. A. Bonney, managing director, at the company's fifth annual works dinner.

E. C. D. LIMITED, Tonbridge, Kent, announce that arrangements have been made for them to manufacture and sell under an exclusive licence in Great Britain, and on a non-exclusive basis in certain other territories the tonnage ozone equipment of the Welsbach International, Inc., of Philadelphia, U.S.A.

AT THE CHESTERFIELD TECHNICAL COLLEGE, Mr. S. H. Russell, gave a lecture on "Our Foundry Methods compared with Those of the United States." Mr. Russell was leader of the Grey Iron Foundry Productivity Team which visited America. The chairman of the college meeting was Mr. R. J. Barclay, managing director, of Markham & Company, Limited.

THE ANNUAL LUNCHEON of the Institute of Welding will be held at the Cafe Royal, Regent Street, London, W.1, on January 30, at 12.30 for 1 p.m. The president of the Institute, Mr. H. J. Thompson, M.I.Mech.E., will take the chair and Mr. A. C. Hartley, C.B.E., M.I.MechE., president of the Institution of Mechanical Engineers will be principal guest. Tickets, price 22s. 6d., are obtainable from the secretary.

"PROTECTION AND ELECTRODEPOSITION OF METALS," the third volume of Selected Government Research Reports, was published last week for the Department of Scientific & Industrial Research by His Majesty's Stationery Office, price £1 10s. 6d. (6 dollars 75 cents., U.S.A.), by post £1 11s. 3d. It contains selected reports, mostly unpublished, on work carried out during the war by the Ministry of Supply and the Ministry of Aircraft Production.

DUE PRINCIPALLY to increases of 17,000 tons in coal shipments and of 10,000 tons in those of iron and steel, Tees exports in November last reached a total of 125,316 tons, a net increase of 22,162 tons over the tonnage exported in the previous month. Imports in November reached 251,026 tons, the imports of foreign ore having increased by 38,000 tons. On the other hand, there was a decrease of 22,000 tons in the intake of scrap compared with November, 1950.

MR. S. A. DAVIS, Regional Controller of the Ministry of Supply for the Midlands, is to take the Chair at a one-day conference which the Birmingham branch of the Institute of Personnel Management is organizing at the Botanical Gardens, Birmingham, on February 13. The subject for discussion will be "The Ageing Population and Productivity" and Councillor A. G. B. Owen, managing director of Rubery Owen Company, Limited, will open the proceedings.

THE NEW YEAR HONOURS list, 1952, records the award of the B.E.M. to Mr. G. P. Hibbs, patternmaker, British Thomson-Houston, Rugby. Mr. Hibbs has given long and devoted service to the Company, having worked in the patternshop for over 48 yrs., several of them patternmaking for large steam-turbine casings. Ever since he joined the forerunner of the A.E.U. in 1899, Mr. Hibbs has been a staunch trade unionist. After a time as branch secretary of the United Pattern Makers Association, he was president for 25 yrs.

THE SHIPMENT of the first cargo of iron ore from Cockatoo Island, Yampi Sound, Western Australia, for the blast-furnace plants of the Broken Hill Proprietary Company, Limited, at Newcastle and Port Kembla, New South Wales, was an important event in the history of the Australian iron and steel industry. The iron ore is a high-grade hematite, low in phosphorus (0.005 to 0.05 per cent.) and in sulphur (absent or not exceeding 0.05 per cent.). There are very substantial deposits, but with a round trip of roughly 6,000 miles to the A.I.S. Kembla works the freight burden is considerable.

A TEAM of experts on Britain's rearmament programme left on Tuesday to visit the United States for four weeks to study American methods in use, both in Government arsenals and in industry, for the procurement, production, inspection and packaging of ammunition. Among mainly military and Ministry personnel in the 14-member team are included Mr. G. Kershaw, technical manager, Greenwood & Batley Limited; Mr. H. Latham, works manager, fuze department, and Mr. J. S. Ashbey, deputy chief tool and plant engineer, both of Ferranti Limited: and Mr. A. Bellamy, assistant production manager, ammunition department, I.C.I. Limited, Metals Division.

AT THE FIRM'S New Year party on January 5, Mr. F. N. Lloyd, managing director of F. H. Lloyd & Company, Limited, the Wednesbury steel casting concern, called upon fifteen hundred workers to achieve a target of 26,000 tons this year. This was 5,000 tons more than the high target reached last year and Mr. Lloyd, reminding employees that such an achievement would mean a great deal of hard work, said, "It is a pity we have had to set so high a figure, but the need for steel castings and the rearmament programme have made it essential." The firm anticipates that production demands will necessitate increased night work, and expects to have up to 50 per cent. of the employees on night shifts.

MEETING on January 8 to consider replies on the metal-position questionnaire sent to 800 local firms, the Midlands committee of the Engineering Industries Association, of which Mr. Arthur Keats, managing director of Fisher & Ludlow Limited, is regional chairman, concluded that whereas it is impossible at present to make any definite statement on the effects of the steel allocation, the "crux of the matter" is whether or not manufacturers can place orders for the full amount of their allocation in view of the short time available before February 4 when the latest system becomes effective. An assurance is wanted from the Government that there will be no "dud cheque" allocation such as has happened in the past.

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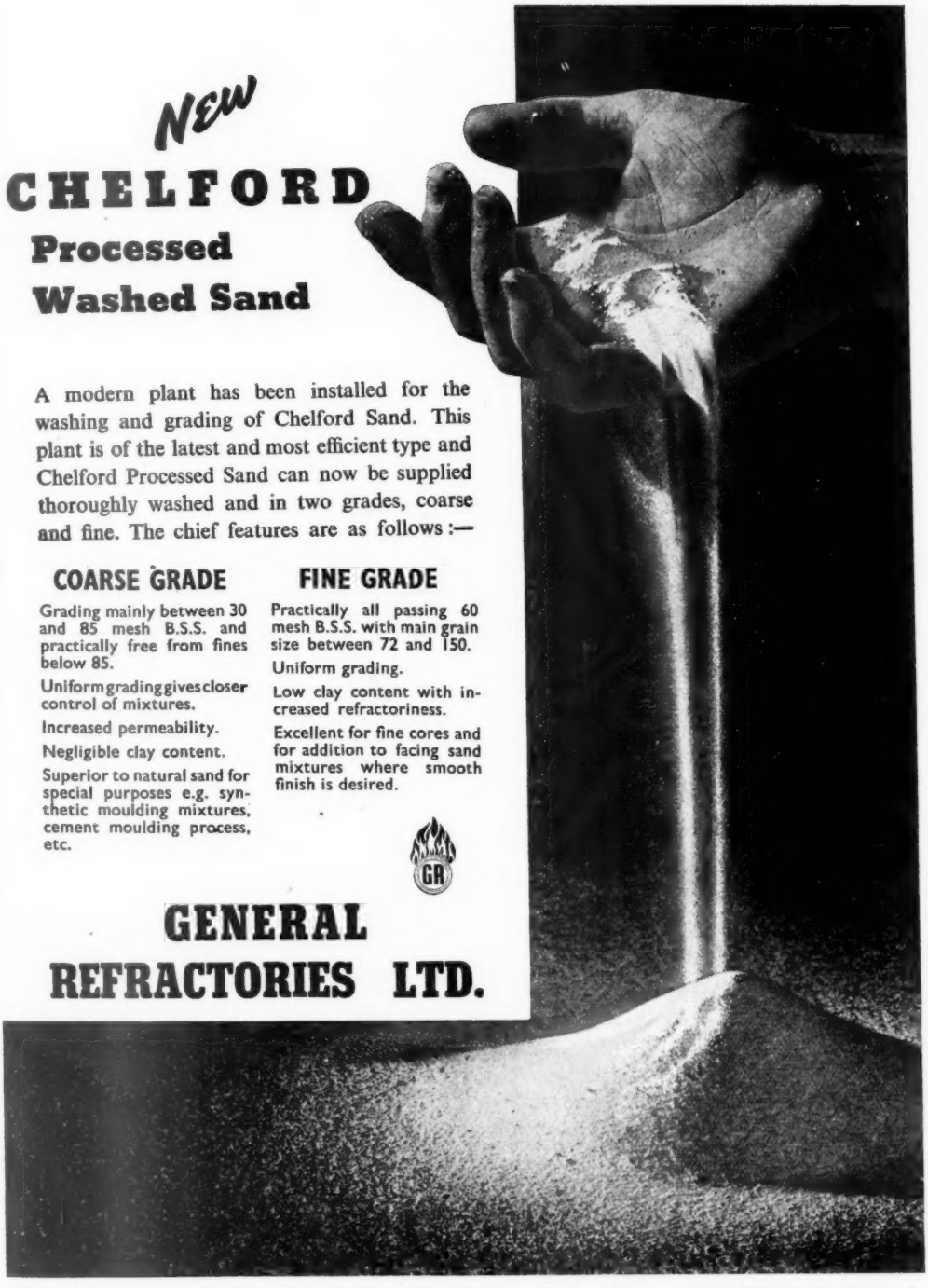

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Raw Material Markets

Iron and Steel

The raw material supply position continues to be the chief problem at the foundries. Orders in the industry are plentiful and generally sufficient manpower is available. Indications at present point to a continued struggle to secure adequate supplies of pig-iron, scrap, and coke. The furnaces now in blast are able to maintain good outputs of pig-iron; with improved ore supplies and some slight improvement in the supply of coke, prospects are brighter now than they have been for some months of an expansion in pig-iron production and of the possibility of fresh units being blown in.

What proportion of increased outputs, if any, would be made available to the foundries it is difficult to assess. The acute shortage of scrap at the steelworks is likely to continue for some time and growing demands for steelmaking pig-iron will be made, which, if taken from the furnaces now in blast, would add considerably to the difficulties of the foundries. No grade of pig-iron is available to the foundries in adequate tonnages. Current deliveries of low- and medium-phosphorus irons are totally inadequate for the general engineering and speciality foundries; every endeavour is being made to secure other irons, such as hematite, refined, and Scotch foundry iron, but the quantities forthcoming do not fill the breach. The light and jobbing foundries are also in need of bigger quantities of high-phosphorus pig-iron.

The supply of scrap continues to be difficult. Few foundries have any stocks on which to draw. Heavy cast-iron scrap is very scarce. This necessitates the use of larger quantities of pig-iron, and some foundries have found it necessary to buy off-grade pig-iron at considerably higher prices.

Foundry coke is being delivered fairly regularly, but the allocations which are being made by the coke ovens are based on a reduction of 12 per cent. on previous deliveries. Furnace coke for heating purposes is being received to requirements, and ganister, limestone, and firebricks are delivered in satisfactory quantities.

The re-rollers are still unable to make any headway in production, as there is no improvement in the supply of semi-manufactured steel. The accumulation of supplies at the end of the recent holiday period was very small and barely sufficient to enable work to be resumed. In fact, some units were forced to prolong the holiday. The allocations of steel from home works for the current period are generally on the same levels as in the previous three months, but if these are not augmented with supplies from oversea the tonnages will remain far below the quantities required. All arisings of defective material and crops, as well as any other material suitable for conversion, are readily accepted. The sheet re-rollers cannot cope with the work on hand owing to insufficient supplies of sheet bars.

Non-ferrous Metals

With the publication of the November details of consumption, etc., by the British Bureau of Non-ferrous Metal Statistics, we are within striking distance of the end of the year and it will not be long before the full story is available for the 12 months. In November, consumption of copper was 50,295 tons, compared with 51,799 tons a month earlier. Very little change was seen in the usage of virgin copper, but secondary went down from 20,973 tons to 19,330 tons.

For the 11 months to November 30, last year's advancing total of consumption was 571,107 tons, compared with 481,989 tons in the corresponding period of 1950. The increase was enirely accounted for by a rise in the scrap figures. At November 30 stocks of copper stood at 119,395 tons, against 122,808 tons a month earlier.

Stocks of lead, on the other hand, increased from 47,322 tons to 56,656 tons at November 30. Consumption fell from 29,964 tons, virgin and secondary, in October to 28,674 tons. In zinc, usage at 24,994 tons was about 200 tons down, while stocks went down from 35,684 tons to 31,423 tons at November 30. In 11 months to the end of November consumption of zinc, all grades, was 259,725 tons, against 305,376 tons in the same period in 1950.

Consumption of tin in November was 2,020 tons, which was slightly lower than the month before. Stocks of tin in consumers' hands at November 30 were 1,646 tons.

The firm tone noticeable on the tin market since the beginning of the year has continued. News of a resumption of buying by the United States is awaited daily and it is this expectation that has been responsible for putting up the price in London. But it would be wrong to suppose that we are likely to see a run-away market in London just because America has decided to appear again in the role of buyer

What might perhaps be regarded as an absolute maximum for tin at present is the price demanded by Bolivia, *viz.*, $1.50, which is equal to £1,200 per ton, Probably the producers themselves do not expect to obtain such a high figure and would be satisfied with less. Some months ago the opinion was hazarded that £1,000 was a reasonable level for tin. This may well prove to be true.

London Metal Exchange official tin quotations were as follow :—

Cash—Thursday, £957 10s. to £960; Friday, £960 to £962 10s.; Monday, £955 to £957; Tuesday, £962 10s. to £963; Wednesday, £969 to £970.

Three Months—Thursday, £957 10s. to £960; Friday, £960 to £962 10s.; Monday, £955 to £957 10s.; Tuesday, £962 10s. to £963; Wednesday, £968 to £969.

Export of Copper and Zinc Semis

The Board of Trade has announced that in conformity with the recommendations of the International Materials Conference exports of semi-manufactured copper and zinc and their alloys in the first quarter of 1952 and until further notice will be licensed at 80 per cent. of the rate of export in 1950.

The statement recalls that, because of the world shortage of the raw materials and the high rate of demand for essential purposes, exports of semi-manufactured copper and copper alloys in the second, third, and fourth quarters of 1951 were restricted to about half the rate for the first six months of 1950.

ALLOY STEEL & IRON COMPANY, LIMITED, have had plans drawn up to erect a new foundry in Foundry Street, Chesterfield.

C. W. TAYLOR & COMPANY, LIMITED, Templetown Foundry, South Shields, are negotiating for a site on which to build extension of premises.

WORK HAS STARTED on the erection of the steel structure of the Rolls-Royce jet-engine factory at East Kilbride, for which Colville Construction Company has been given the contract. Most of the site-preparation has been completed, and it is hoped the building contractors will be able to make a start with brickwork shortly. The factory will employ over 4,000 and the project is the biggest post-war enterprise of its kind in Scotland.